SOUTH CLEAR ZONE (SS-034)
SITE INVESTIGATION REPORT

PLATTSBURGH AIR FORCE BASE
PLATTSBURGH, NEW YORK

DRAFT FINAL

OCTOBER 1997

UNITED STATES DEPARTMENT OF THE AIR FORCE
INSTALLATION RESTORATION PROGRAM

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EXECUTIVE SUMMARY

The South Clear Zone (SS-034) is an approximately 4-acre site located about 1,000 feet east of the southern end of the Plattsburgh AFB runway near Route 9. Prior to the United States Air Force (USAF) acquiring property for the establishment of a clear zone in the early 1980s, it was a privately-owned parcel. For approximately 20 years prior to the property being acquired by Plattsburgh AFB, a propane distributor leased the property as a storage facility. Over 30 years ago, during the construction of Route 9, an asphalt batch plant reportedly was located on site. Petroleum products used and/or stored at the batch plant may have included No. 2 fuel oil for the aggregate dryer, asphalt cement, and possibly diesel oil and gasoline for onsite equipment and trucks.

Upon acquiring the property, the USAF demolished the existing structures. While razing a building related to the propane storage facility, a buried steel tank was uncovered. Observations of the tank and the remaining buried pipe that had connected it to the building indicated the tank to be a septic tank. This tank was removed from the site and disposed of in July 1997.

Potential chemicals of concern at the site might include typical petroleum products stored and handled at a hot mix asphalt plant such as No. 2 fuel oil, No. 2 diesel oil, asphalt cement, and gasoline. The propane distributor reportedly used no degreasers at the site.

In 1992, a Preliminary Assessment for SS-034 was completed and included a review of historical records, personnel interviews, and a site walkover (Malcolm Pirnie 1992a). Other than reporting an isolated tar spill on an abandoned railroad siding, no visual evidence of contamination was noted at the site. In the fall of 1994, this Site Investigation was initiated to analyze the effects of the uncertain use of the excavated tank and past staging of the asphalt plant on site.

The specific objectives of the Site Investigation (SI) were to describe the physical condition of the site, to evaluate the nature and extent of chemical contamination in the site groundwater and soils, to evaluate the risks posed by site contaminants to human health and the environment, and to determine if remedial or removal actions are warranted. Site Investigation field activities included the advancement of eight soil borings, an attempted monitoring well installation, the collection and chemical analysis of 10 soil samples, and observations of the site's physical condition. These data were compiled and utilized to quantitatively assess potential risks posed by site contaminants to human receptors.

The site is triangular in shape and bordered by undeveloped wooded areas to the east, the Salmon River to the south, and the Delaware & Hudson Railroad to the west. The site is well vegetated and relatively flat, except at its southern boundary which slopes steeply to the Salmon River. Surface water drainage and groundwater flow would be toward the Salmon River. No surface water was observed on site during the field activities and groundwater was found deep within a low permeability clay unit. No significant potential contaminant migration pathways were apparent. The isolated tar spill noted by Malcolm Pirnie in the Preliminary Assessment Report was not observed during the SI or during any subsequent site visits by USAF personnel. Four railroad ties that were part of the abandoned railroad siding have a tar-like substance on their top surfaces, but none of this material is on the sides of the ties or on/within the soil between the ties.

The soils at SS-034 were found to contain the organic chemicals acetone, 1,1,1-trichloroethane, diethylphthalate, and di-n-butylphthalate. None of these chemicals was present at levels that exceeded TBC (regulatory) criteria. The metals aluminum, beryllium, cadmium, chromium, iron, magnesium, manganese,

nickel, potassium, sodium, and zinc were detected at concentrations that were slightly elevated as compared to background soils at Plattsburgh AFB. However, these elevated metals concentrations probably represent natural differences in soil elemental composition rather than in soil contamination resulting from past site activities. No unacceptable carcinogenic or noncarcinogenic human health risk is associated with exposure to site soils. No groundwater samples were collected at SS-034. The water table appeared to be in a clay unit which did not yield water at a sufficient rate to allow monitoring well development and sampling.

Based upon the negligible impact to human health and the environment posed by SS-034, no action is warranted to remediate chemicals present on site due to past activities. A decision document should be prepared to this effect.

1.0 INTRODUCTION

This Site Investigation (SI) Report presents, summarizes, and provides interpretations and conclusions regarding data gathered during SI field activities at the South Clear Zone site (SS-034) at Plattsburgh Air Force Base (AFB) in Clinton County, New York. Investigations and site remediations are being conducted at Plattsburgh AFB as part of the Department of Defense's Installation Restoration Program (IRP). The IRP was developed as a component of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The IRP at Plattsburgh AFB currently is being administered by the Air Force Base Conversion Agency and implemented according to an interagency Federal Facilities Agreement (Docket No. III - CERCLA - FFA-10201) among the United States Air Force, (USAF) the United States Environmental Protection Agency (USEPA), and the New York State Department of Environmental Conservation (NYSDEC).

Plattsburgh AFB is located in northeastern New York State (Figure 1-1). It is bordered by the City of Plattsburgh to the north, Lake Champlain to the east, lake shore communities to the southeast, the Salmon River and agricultural land to the south, and Interstate 87 to the west. The base, formerly the home of the 380th Air Refueling Wing, was closed in September 1995 by the USAF. The Plattsburgh Airbase Redevelopment Corporation (PARC) currently is responsible for redevelopment of the base property. The final base reuse plan indicates a public/recreational reuse for the SS-034 site (Tetra Tech 1995). Off-base areas immediately adjacent to the site currently are zoned residential and future residential development of the site also might be plausible.

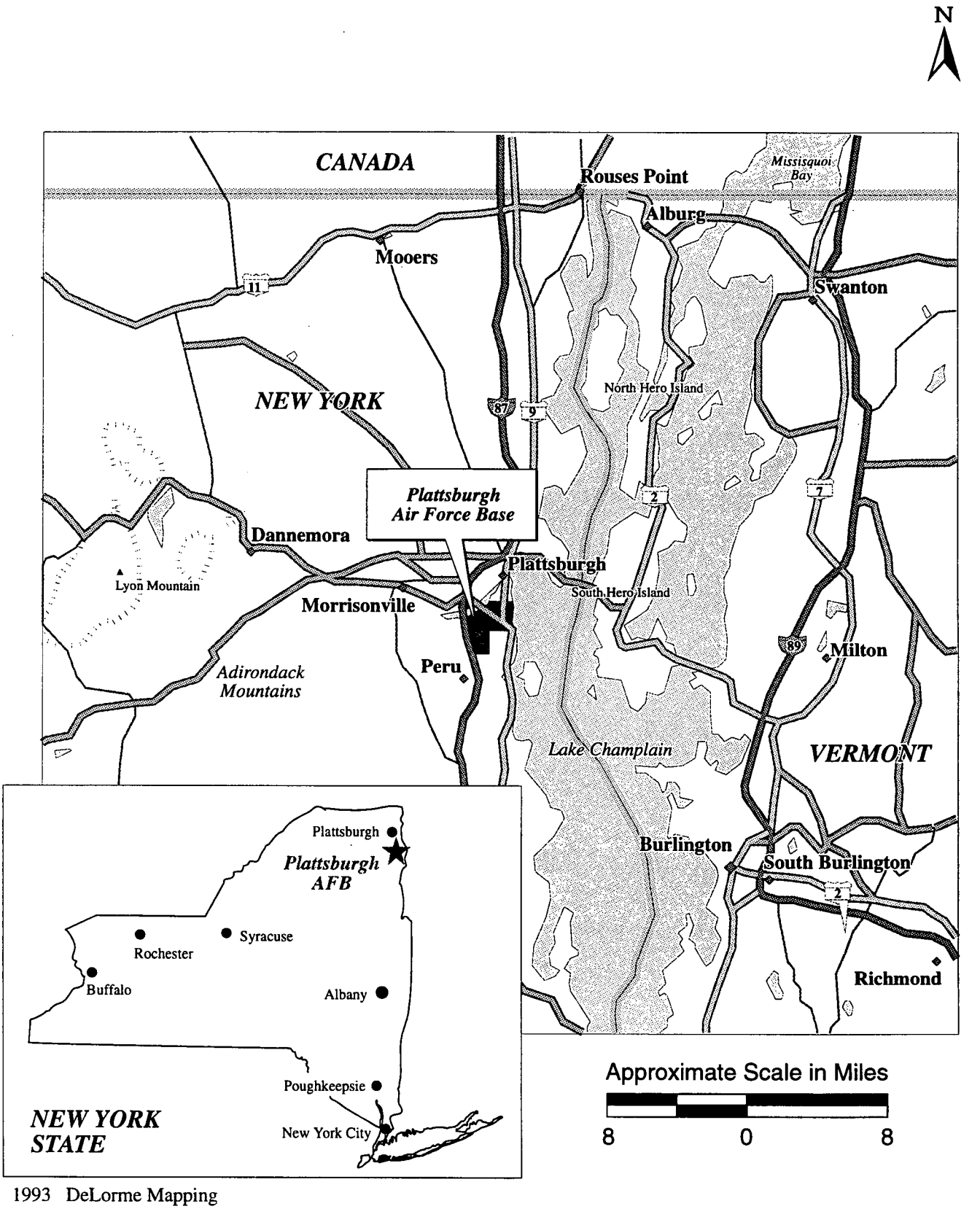
1.1 Purpose of the Report

The specific objectives of the SI were to: 1) describe the physical conditions of the site; 2) evaluate the nature and extent of chemical contamination in the site groundwater and soils; 3) evaluate the risk posed by site contaminants to human health and the environment; and 4) determine if remedial or removal actions are warranted. Activities performed to satisfy these objectives included surface soil sampling, attempted monitoring well installation, chemical analysis of soil and groundwater samples, and a human health risk assessment.

1.2 Site Description and History

The SS-034 is located approximately 1,000 feet east of the southern end of the Plattsburgh AFB runway near Route 9 (Figure 1-2). Prior to the USAF acquiring property for the establishment of a clear zone in the early 1980s, it was a privately owned parcel. For approximately 20 years prior to its acquisition by Plattsburgh AFB, a propane distributor leased the property as a storage facility (Figure 1-3 and Photos 1 through 4). The propane distributor recalled the presence of three half-buried tanks at the site when he first moved his operations to this location. The largest of the tanks was estimated to have a volume of 100 gallons. There is no information regarding the contents, former locations, or disposition of the tanks.

Over 30 years ago, during the construction of Route 9, an asphalt batch plant reportedly was located on site. No specific information is available on the operations at the asphalt plant, but a typical hot mix asphalt plant uses coarse aggregate (crushed stone), fine aggregate (sand), and asphalt cement to product hot mix asphalt pavement, commonly known as "blacktop." The aggregates are heated in an oil-fired rotating drum



1993 DeLorme Mapping

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URS CONSULTANTS, INC.	VICINITY LOCATION MAP	FIGURE 1-1

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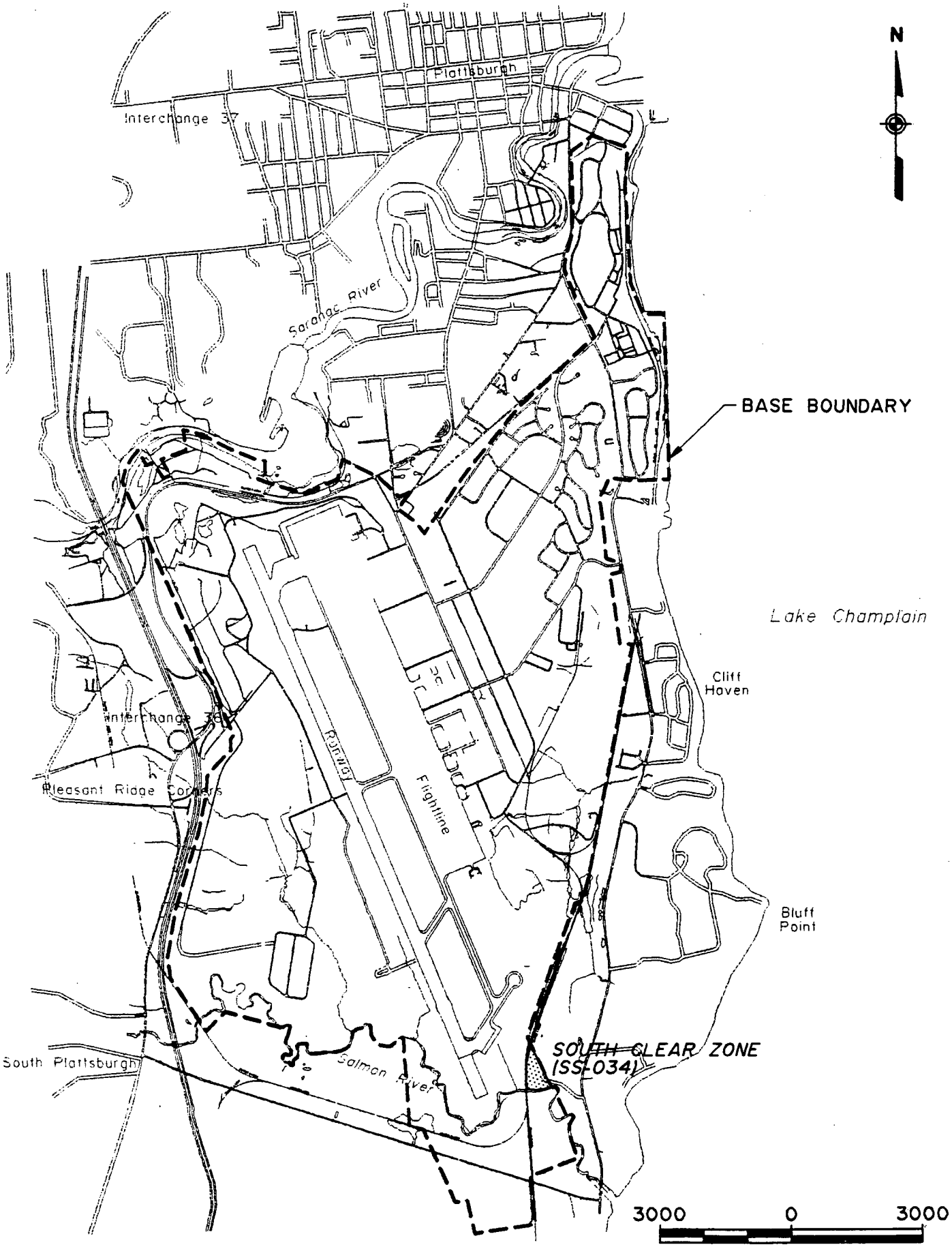

URS CONSULTANTS, INC.	PLATTSBURGH AFB LOCATION OF IRP SITE SS-034	FIGURE 1-2

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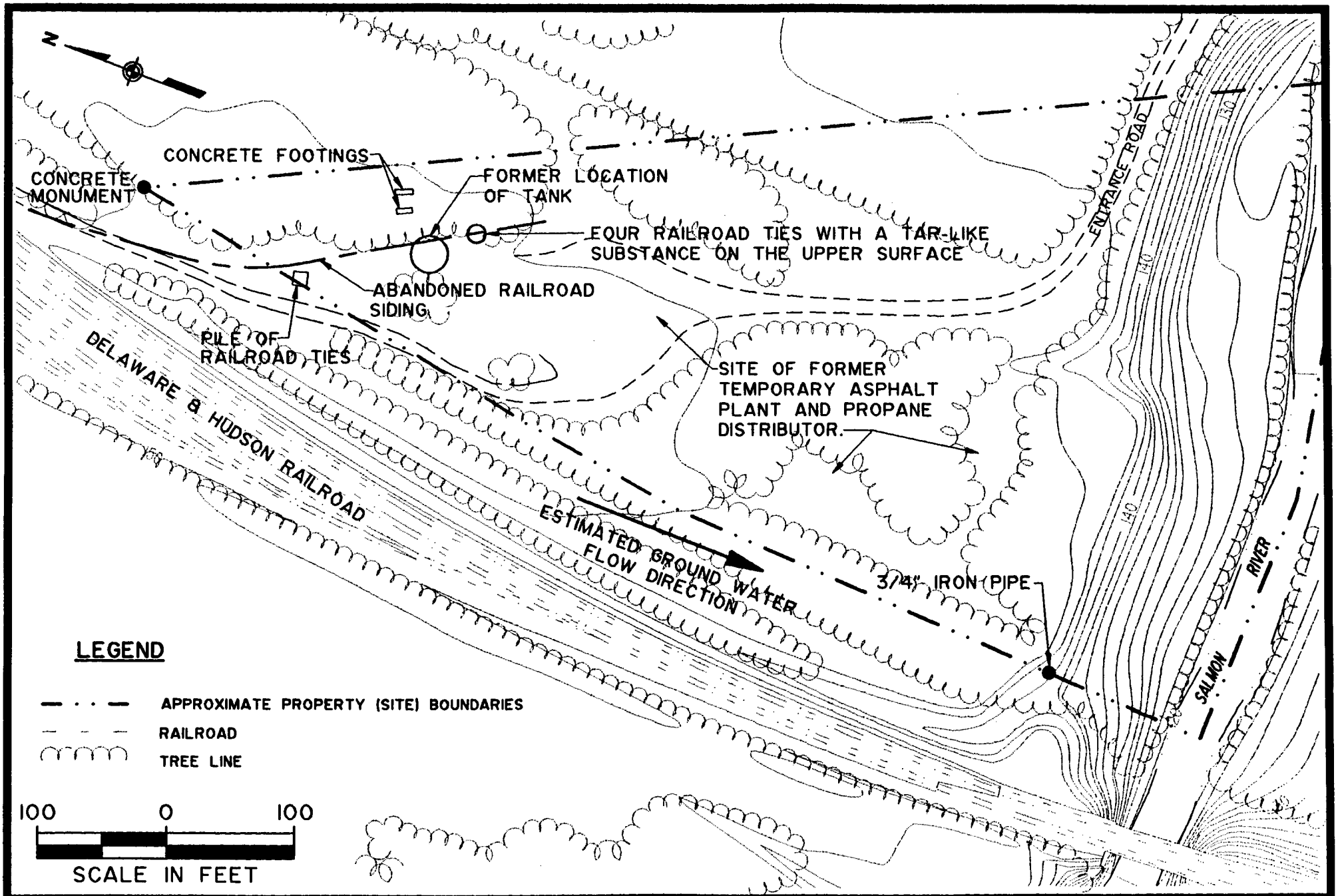

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SOUTH CLEAR ZONE (SS-034)
SITE FEATURES

FIGURE 1-3

PHOTO 1 - A northwestward view from the entrance road across the large open area where the asphalt plant and propane distributorship were located. Delaware and Hudson Railroad cars are in the background.

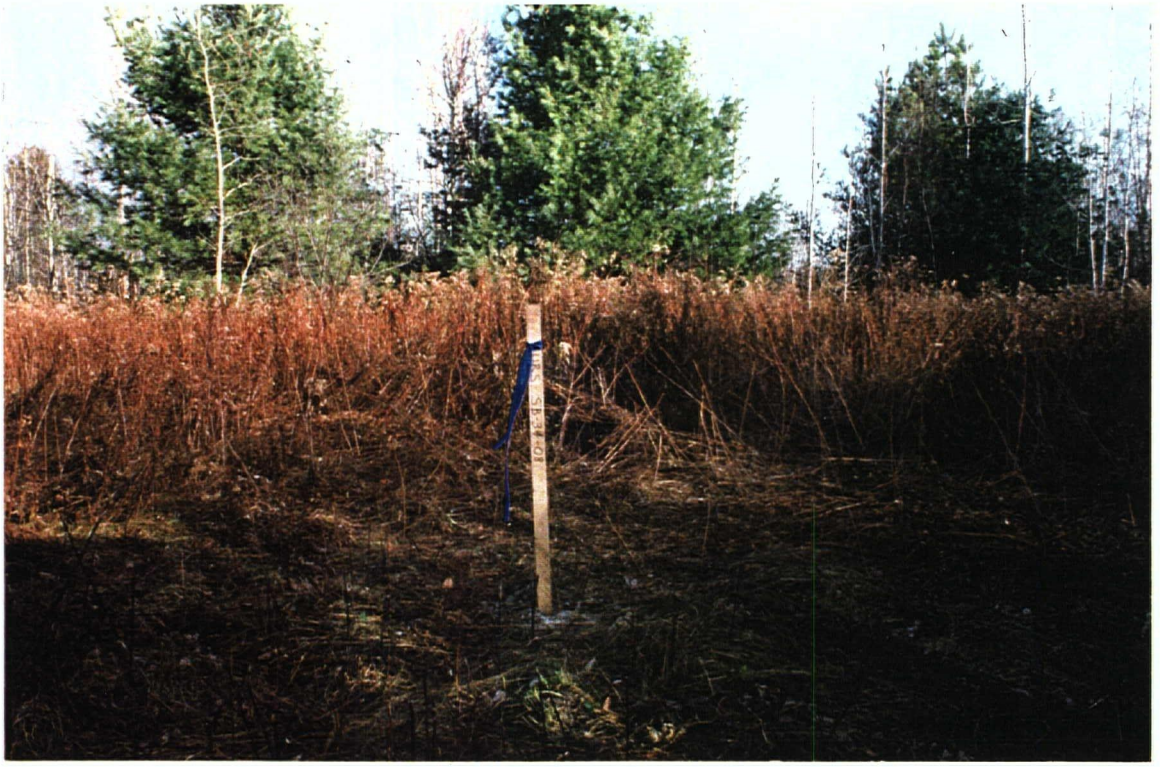

PHOTO 2 - Northward view of the open area where boring SB-34-08 was located.

SITE PHOTOS - SS-034

PHOTO 3 - Northwestward view of the abandoned tank and open excavation that is covered with plywood. Boring location SB-34-06, directly downgradient of the tank, is marked by the stake. This tank was removed from the site in July 1997.

PHOTO 4 - A view of temporary well MW-34-001 showing the plastic gray silty clay (drill cuttings) that underlies the site.

prior to the addition of the asphalt cement. Petroleum products used and/or stored at the batch plant may have included No. 2 fuel oil for the aggregate dryer, asphalt cement, and possibly diesel oil and gasoline for onsite equipment and trucks. The abandoned railroad siding that leads into the site once may have serviced the batch plant.

Upon acquiring the property, the USAF demolished the existing structures. While razing a building related to the propane storage facility, a buried steel tank was uncovered. Observations of the tank and the remaining buried pipe that connected the building and tank indicated it to be a septic tank. The tank was removed from the site and disposed of in July 1997.

Potential chemicals of concern at the site might include typical petroleum products stored and handled at a hot mix asphalt plant—No. 2 fuel oil, No. 2 diesel oil, asphalt cement, and gasoline. The propane distributor reportedly used no degreasers at the site.

1.3 Previous Investigations

The only previous investigation of the site was the preliminary assessment which consisted of a record search and a site walkover (Malcolm Pirnie 1992a). Other than an isolated tar spill on the abandoned railroad siding, no visual evidence of contamination was noted at the site. The isolated tar spill noted by Malcolm Pirnie was not discovered during the site investigation or during any subsequent visits by USAF personnel. Four railroad ties that were part of the abandoned railroad siding have a tar-like substance on their top surfaces, but none of this material is on the sides of the ties or on/within the soil between the ties (Figure 1-3 and Photos 5 and 6).

PHOTO 5 - Southeastward view of the abandoned railroad siding leading from the main Delaware and Hudson Railroad line into site SS-034.

PHOTO 6 - A view of one of the four railroad ties in the abandoned railroad siding that has a tar-like substance on its top surface. None of the tar-like material is on the sides of the ties, or on or within the soil between the ties. The soil adjacent to the ties is wet, due to rainfall, and is a dark brown sandy loam with a high content of decaying plant matter.

SITE PHOTOS - SS - 034

2.0 TECHNICAL APPROACH OVERVIEW

During November and December 1994, SI field activities were conducted and consisted of advancing and sampling eight soil borings.

The scope of the sampling and analysis plan for SS-034 originally had specified the installation of three groundwater monitoring wells. Two discrete soil samples were to be collected from each well boring and a groundwater sample was to be collected from each of the three completed wells. Due to the presence of a shallow clay layer across the site, the sampling and analysis plan was revised. Eight shallow borings were substituted for the three monitoring wells originally proposed. Ten soil samples were collected and no groundwater samples were collected.

The field and analytical programs otherwise were carried out in a manner generally consistent with the *Final Work Plan* (Malcolm Pirnie 1992b), *Chemical Data Acquisition Plan* (Malcolm Pirnie 1992c), *Site Safety and Health Plan* (Malcolm Pirnie 1992d), and the *Monitoring Well Installation Plan* (Malcolm Pirnie 1992e). However, following consultation with Plattsburgh AFB, the NYSDEC, and the USEPA, some additional modifications were made to the sampling and analytical program. These modifications included:

- All analytical data are USEPA Level IV with Level IV CLP deliverables. No analytical data are USEPA Level III.
- Hexane was eliminated as a rinse agent during the decontamination of sampling equipment—only a methanol rinse was used.
- Rinse blanks were taken from soil sampling apparatuses at the frequency of 1 per day per apparatus.
- Duplicates were taken at a minimum frequency of 1 per 20 samples for each medium.
- Matrix spike/matrix spike duplicate (MS/MSD) samples were taken at a frequency of 1 per 20 samples.

2.1 Soil Sampling Procedures

Ten discrete soil samples were taken at eight boring locations (Figure 2-1). Tri-State Drilling & Boring, Inc. of West Burke, Vermont performed the drilling with a truck-mounted Mobile B-57 drill rig using 6¼-inch internal diameter (ID) hollow stem augers (HSAs) for borings WB-MW-34-001 and WB-MW-34-003. Split-barrel samplers alone (no HSA) were used for the remaining six borings (SB-34-02, and SB-34-04 through SB-34-08).

The borings were sampled continuously to their completion depth for physical description of the subsurface materials using split-barrel samplers according to the American Society for Testing and Materials (ASTM) Standard D 1586-84. None of the soil samples exhibited elevated photoionization detector (PID) readings, visual contamination, or unusual odors. Therefore, samples for chemical analysis were collected from near surface soils (0 to 2 feet deep) where possible spills may have occurred, and just slightly above and at the top of the clay layer (2 to 7 feet deep) where downward migrating spills may have accumulated. Two

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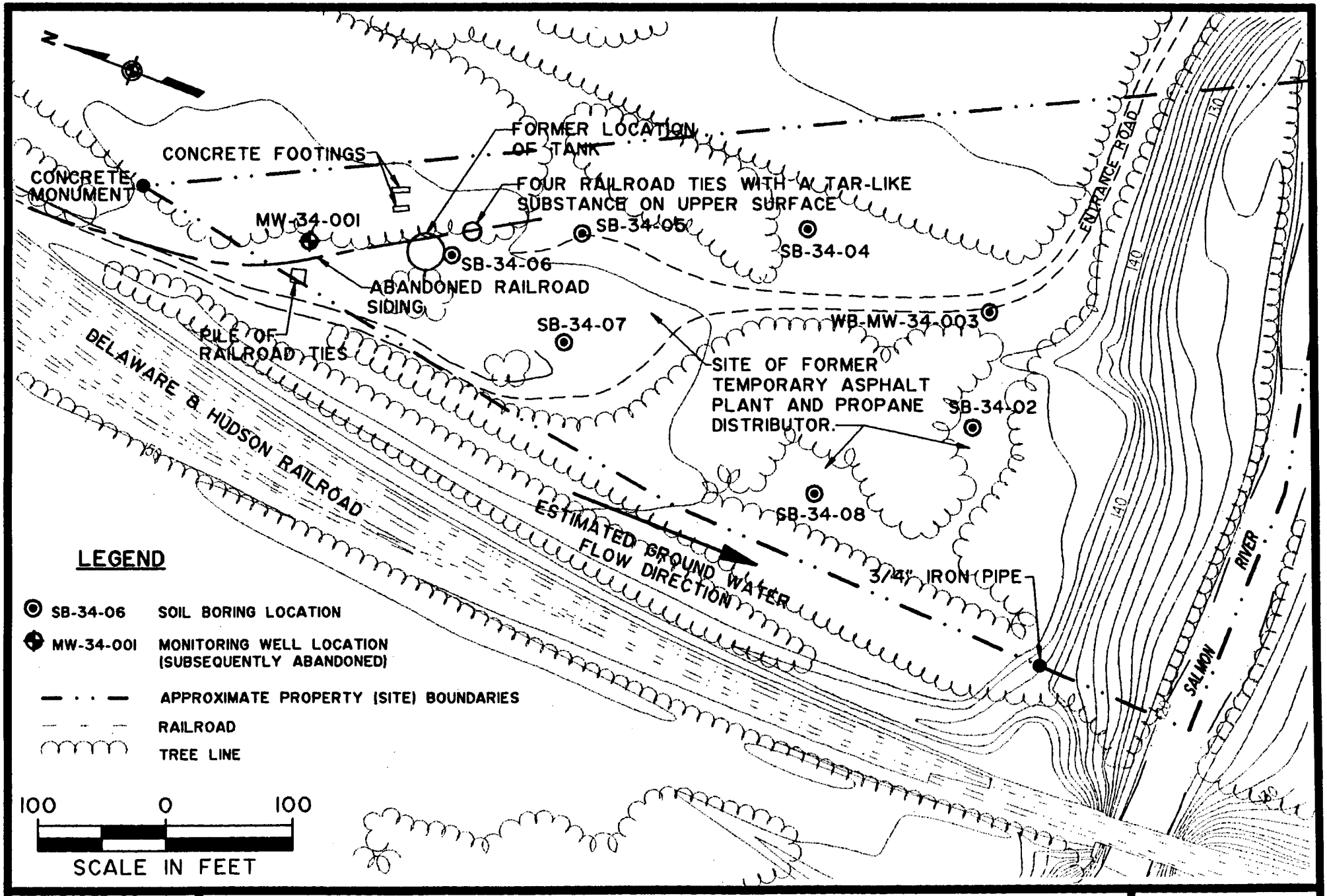

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SOUTH CLEAR ZONE (SS-034) SAMPLING LOCATIONS

FIGURE 2-1

samples were collected from each of the deeper borings (WB-MW-34-001 and WB-MW-34-003). The depth to clay was shallow (less than 2 feet) in borings SB-34-02, SB-34-04, SB-34-07, and SB-34-08, and the 0- to 2-foot depth split-spoon sample contained the entire interval from ground surface to the top of the clay layer. Only one soil sample was collected for chemical analyses from each of these borings.

In borings SB-34-05 and SB-34-06, the top of clay surface was encountered near the top of the 2- to 4-foot depth split-spoon. The soil that was at or above the top of the clay layer was collected from each 2- to 4-foot depth split-spoon (typically the top 3 to 6 inches of soil) and composited with the soil from each boring's respective 0- to 2-foot feet depth split-spoon sample. All samples were analyzed for target compound list (TCL) volatile and semivolatile organic compounds and target analyte list (TAL) metals. Analytical results are provided in Appendix A and sample descriptions are provided in Appendix B. Soil boring logs are contained in Appendix C.

The semivolatile fraction of the analysis of sample SB-34-05-0, collected on November 16, 1994, had poor surrogate recovery results that were below acceptable limits, which would have invalidated the data. A re-extraction of the sample would have resulted in an exceedance of the sample holding time. Therefore, SB-34-05-0 was resampled on December 7, 1994 for the semivolatile fraction. It was decided not to remobilize a drill rig to the site, but instead to use a hand auger to collect the sample. However, the hand auger could not penetrate deeper than 1.5 feet because of gravel. Therefore, the hole was terminated at that depth (i.e., auger refusal) resulting in a sample for semivolatile analysis from a slightly smaller interval (i.e., 1.5 feet) than the sample collected earlier for the balance of the analysis (i.e., 2.2 feet).

2.2 Well Installation and Abandonment

A temporary monitoring well was installed at boring location WB-MB-34-001. Although no water was encountered in this boring, well MW-34-001 was installed to evaluate groundwater quality and to determine if sufficient groundwater was present to warrant additional well installations.

The monitoring well was constructed with a 10-foot long, 2-inch ID, schedule 40 polyvinyl chloride (PVC) screen (0.010-inch slot) set from a depth of 6 to 16 feet and threaded to a 6.5-foot long, 2-inch ID, schedule 40 PVC riser pipe with a lockable cap. A sand pack was installed around the screen from a depth of 4 to 16 feet and a bentonite seal was placed from a depth of 3 to 4 feet. No grout was installed in the residual annular space pending an assessment of recharge into the well.

Twenty-four hours after MW-34-001 had been installed, less than 1 foot of water was present in the well. This rate of recharge would have made the well extremely difficult to develop (especially since the majority of the screen was in the clay unit) or sample. The well subsequently was overdrilled with 6¼-inch ID HSA and removed, then the borehole was backfilled with cement-bentonite grout.

Because the water table at MW-34-001 appeared to be in a unit (clay) unable to yield water at a sufficient rate to allow monitoring well development and sampling, no additional monitoring well installations were attempted. The project scope was amended, as previously detailed, to allow for the collection of supplemental soil samples.

3.0 PHYSICAL SETTING

3.1 Surface Features

SS-034 is located approximately 1,000 feet east of the southern end of the Plattsburgh AFB runway near Route 9. The site is triangular in shape and bordered by undeveloped wooded areas to the east, the Salmon River to the south, and the Delaware & Hudson Railroad to the west (Figure 1-3). Two concrete footings and a pile of railroad ties are the only indications that an asphalt plant and propane distributorship were once present at SS-034. The site now is covered with grasses and trees, and the entrance road is overgrown.

The site is relatively flat except at its southern boundary, where a steep slope drops approximately 25 feet to the Salmon River. Surface water drainage generally flows toward the Salmon River, but on the western portion of the site some flow may enter the drainage ditch that parallels the Delaware & Hudson Railroad and discharges into the Salmon River.

3.2 Demography and Land Use

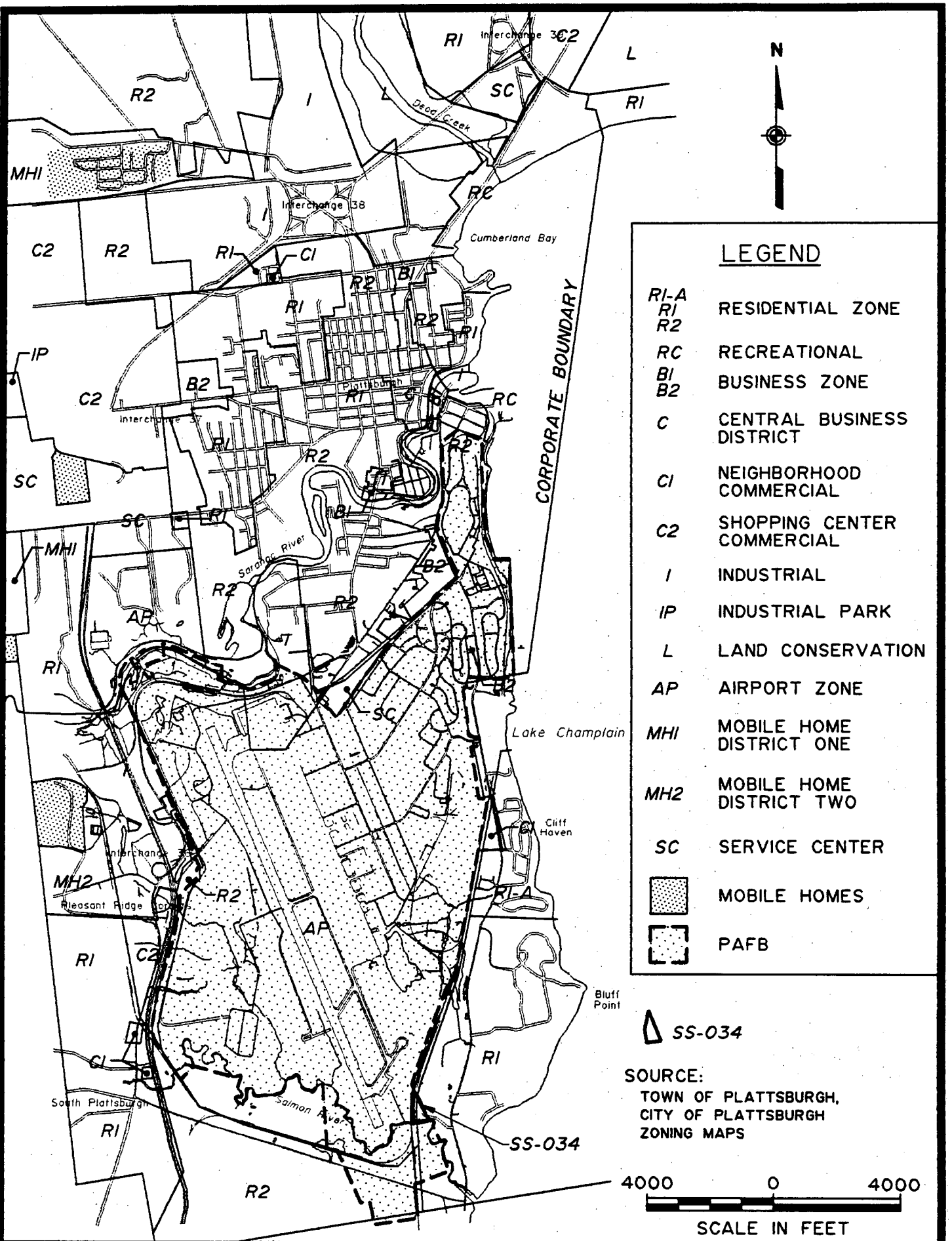
According to the 1990 Census, Greater Plattsburgh has a population of 38,173. Between 1970 and 1990, the population of Clinton County grew from 72,934 to 85,969—an average growth rate of approximately 0.9 percent per year. Assuming this growth rate remains constant, the projected population of Greater Plattsburgh will be approximately 41,751 by the year 2000. Closure of the base, however, may reduce this population by about 6,000.

Land uses near Plattsburgh AFB include residential, commercial, industrial, and recreational. A zoning map for Plattsburgh AFB and vicinity is presented in Figure 3-1. It is possible that zoning will be restructured based upon reuse and redevelopment recommendations from PARC. Off-base areas immediately east of the site currently are zoned residential. The anticipated future use of SS-034 is as public/recreational land, although residential development also may be plausible.

Plattsburgh AFB obtains its potable water from the City of Plattsburgh municipal water system. The municipal water supply sources are located northwest of the City of Plattsburgh. The municipal water system terminates approximately 1 mile northeast of SS-034 and residences to the east and southeast of the site along Route 9 utilize groundwater and surface water (Lake Champlain) as potable water sources. The residential water wells are installed in bedrock. The nearest residence is located approximately 1,000 feet south-southeast of the site and has a bedrock potable water well.

3.3 Vegetative Covertypes

Vegetative covertypes, both aquatic and terrestrial, were mapped during the Step 1 Habitat Assessment (URS 1994a). Covertypes within 1,000 feet of the site are shown in Figure 3-2 and described below. [Plots of covertypes over the entire base at a scale of 1 inch = 200 feet may be found in the *Step 1 Habitat Assessment Report* (URS 1994a).]



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PLATTSBURGH A.F.B.
ZONING MAP

FIGURE 3-1

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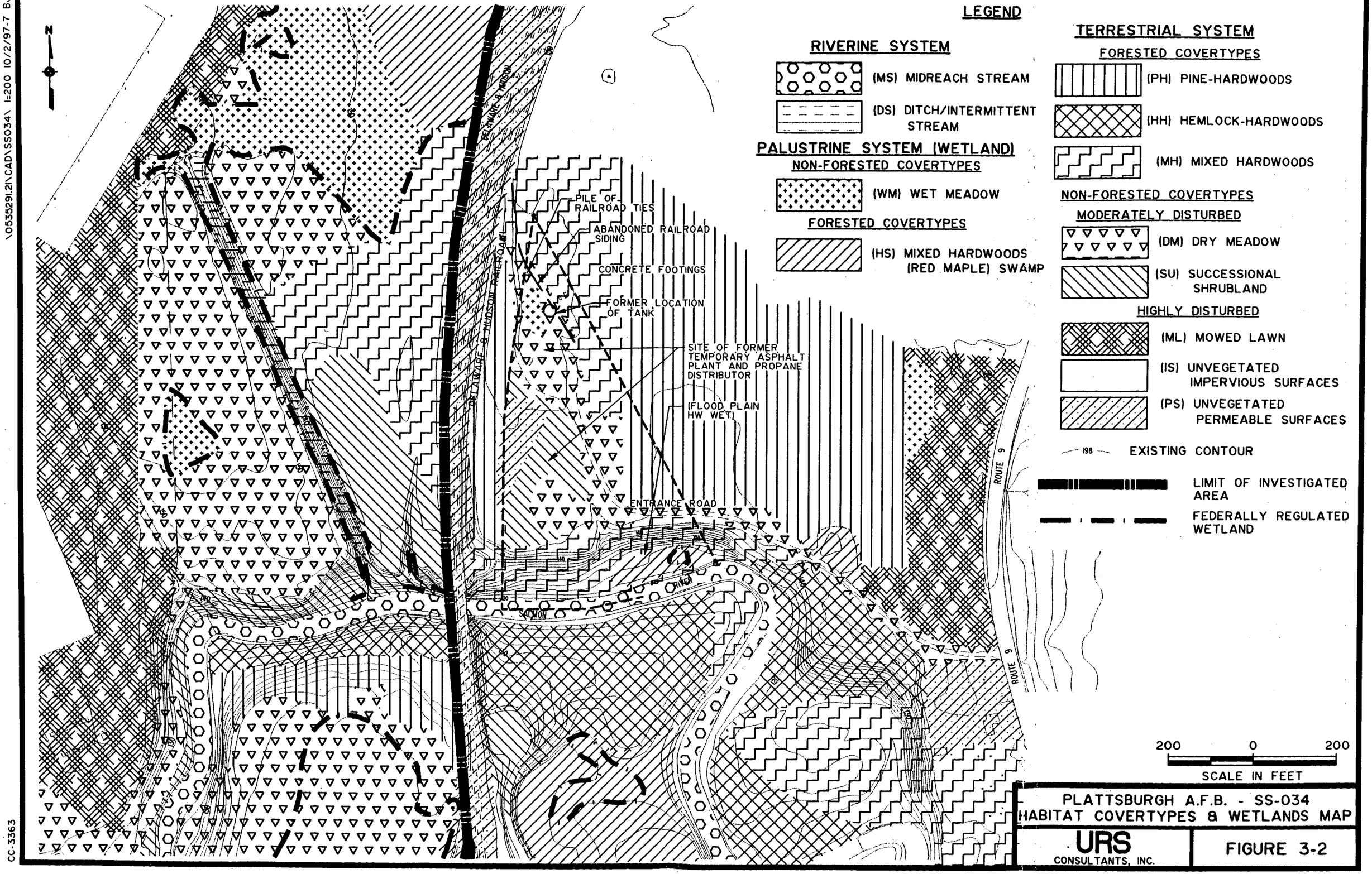

PLATTSBURGH A.F.B. - SS-034
HABITAT COVERTYPES & WETLANDS MAP

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FIGURE 3-2

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- **Riverine System**

(MS) - Midreach Stream - A midreach stream is moderate to large sized with a mainstream dominated by riffle/run/pool associations. Stream bottom substrates are generally bedrock, boulders, cobbles, gravel, or sand. There may be small backwaters, seeps, wetlands, or waterfalls associated with the mainstream habitats. There also may be temporary slackwater regions associated with snags, debris, or beaver dams. It is similar to the midreach stream covertype of Reschke (1990). The Salmon River, immediately south of SS-034, is an example of a midreach stream. Some of the expected fish species in a midreach stream include:

Rainbow Trout *(Oncorhychus mykiss)*
Brown Trout *(Salmo trutta)*
White Sucker *(Catostomus commersoni)*
Silver Redhorse *(Moxostoma anisurum)*
Common Shiner *(Notropis cornatus)*

(DS) - Ditch/Intermittent Stream - This type occurs along small drainageways, either channelized or natural. These drainageways are often lined with plant species from the wet meadow or shrub swamp communities listed below. It is similar to the ditch/artificial intermittent stream covertype of Reschke (1990). There are various intermittent streams/ditches in the grass areas surrounding the runway. An example of this covertype is the ditch located 300 feet west of the site. Fish species that may be found in the ditch include:

Bluntnose Minnow *(Pimephales notatus)*
Creek Chub *(Semotilus atromaculatus)*
Johnny Darter *(Etheostoma nigrum)*

- **Palustrine System (Wetland) - Forested Covertypes**

(HS) - Mixed Hardwoods (Red Maple) Swamp - This covertype generally occurs in wetlands, but it also occurs on seasonally to regularly wet sites. It is similar to the red maple-hardwood swamp of Reschke (1990). Some conifers may be present (e.g., white pine, hemlock, and northern white cedar), but various hardwoods make up more than 50 percent of the stand. Examples of this covertype may be found northwest of SS-034. Dominant plant species include:

Trees/Saplings

Red Maple *(Acer rubrum)*
American Elm *(Ulmus americana)*
Gray Birch *(Betula populifolia)*
Ashes *(Fraxinus pennsylvanica, F. nigra)*
Black Willow *(Salix nigra)*
Cottonwood *(Populus deltoides)*

Shrubs

Alders *(Alnus rugosa, A. serrulata)*
Winterberry *(Ilex verticillata)*
Black Chokeberry *(Aronia melanocarpa)*
Silky Dogwood *(Cornus amomum)*

Northern Arrowwood *(Viburnum recognitum)*
Highbush Blueberry *(Vaccinium corymbosum)*
Glossy Buckthorn *(Rhamnus frangula)*
Pussy Willow *(Salix discolor)*
Meadowsweet *(Spiraea alba)*

Herbs/Ground Cover

Sedges *(Carex crinita, C. lupulina)*
Jewelweed *(Impatiens capensis)*
False Nettle *(Boehmeria cylindrica)*
Poison Ivy *(Rhus radicans)*
Moneywort *(Lysimachia nummularia)*
Cinnamon Fern *(Osmunda cinnomomea)*
Royal Fern *(Osmunda regalis)*
Sensitive Fern *(Onoclea sensibilis)*

- **Palustrine System (Wetlands) - Non-Forested Covertypes**

(WM) - Wet Meadow - This covertype is indicated where various open-habitat grasses, sedges, rushes, bulrushes, and forbs make up more than 50 percent of the areal cover and the area is wetland. Young shrubs and seedlings/saplings may be present, but make up less than 50 percent of the areal cover. This covertype contains various elements of the ditch/artificial intermittent stream, shallow emergent marsh, sedge meadow, and reedgrass/purple loosestrife marsh covertypes of Reschke (1990). Examples of this covertype are found south and west of SS-034. Dominant plant species includes:

Herbs

Cattails *(Typha angustifolia, T. latifolia)*
Bulrushes *(Scirpus atrovirens, S. cyperinus, S. validus)*
Sedges *(Carex crinita, C. vulpinoodea, C. lupulina)*
Rushes *(Juncus effusus, J. bufonius)*
Reed Canary Grass *(Phalaris arundinacea)*
Rice Cut Grass *(Leersia oryzoides)*
Water Millet *(Echinochloa muricata)*
Jewelweed *(Impatiens capensis)*
Blue Vervain *(Verbena hastata)*
Dwarf St. John's-wort *(Hypericum mutilum)*
Giant Goldenrod *(Solidago gigantea)*
Calico Aster *(Aster lateriflorus)*
Boneset *(Eupatorium perfoliatum)*
Beggar-ticks *(Bidens cernua)*
Water-horehound *(Lycopus americanus)*
Purple Willow-herb *(Epilobium coloratum)*
Sensitive Fern *(Onoclea sensibilis)*

- **Terrestrial System - Forested Covertypes**

(PH) - Pine-Hardwoods - This covertype is the most xeric of the forested types and occurs on well-drained sandy soils. It is similar to the Appalachian oak-pine forest and pine-northern hardwoods forest of Reschke (1990). Pines make up more than 50 percent of the stand and some stands are plantations. This covertype occurs throughout the base. Examples may be seen east and south of SS-034. Dominant plant species include:

Trees/Saplings

Pines (*Pinus strobus, P. rigida, P. resinosa*)
Oaks (*Quercus rubra, Q. alba, Q. velutina*)
Aspens (*Populus grandidentata, P. tremuloides*)
Paper Birch (*Betula papyrifera*)
Black Cherry (*Prunus serotina*)

Shrubs

Blueberries (*Vaccinium angustifolium, V. pallidum*)
Black Huckleberry (*Gaylussacia baccata*)
Sheep Laurel (*Kalmia angustifolia*)

Herbs

Bracken Fern (*Pteridium aquilinum*)
Sarsaparilla (*Aralia nudicaulis*)
Indian Cucumber-root (*Medeola virginiana*)

(HH) - Hemlock-Hardwoods - This covertype is more mesic than pine-hardwoods described above. It often occurs on cool north- to east-facing slopes, but also occurs on moist flats. It is similar to hemlock-northern hardwood forest of Reschke (1990). Hemlock makes up more than 50 percent of the stand. This covertype is rare on the base since hemlock-hardwoods tend to be small areas surrounded by mixed hardwood or pine-hardwood forests. An example of this covertype can be found to the south and southwest of SS-034. Dominant plant species include:

Trees/Saplings

Hemlock *(Tsuga canadensis)*
Beech *(Fagus grandifolia)*
Yellow Birch *(Betula alleghaniensis)*
White Pine *(Pinus strobus)*
Sugar Maple *(Acer saccharum)*
Black Cherry *(Prunus serotina)*
Northern White Cedar *(Thuja occidentalis)*

Shrubs

Hobblebush *(Viburnum alnifolium)*
Striped Maple *(Acer pensylvanicum)*

Herbs

Canada Mayflower *(Maianthemum canadense)*
Bluebead-lily *(Clintonia borealis)*
Indian Cucumber-root *(Medeola virginiana)*

(MH) - Mixed Hardwoods - This covertype occurs on mesic sites. It is most similar to successional northern hardwoods, but with elements of the beech-maple mesic forest of Reschke (1990). Some conifers may be present, (e.g., white pine, hemlock, and northern white cedar), but these together make up less than 50 percent of the stand. This covertype is found throughout the base. An area of this covertype occurs northwest of SS-034. Dominant plant species include:

Trees/Saplings

Red Maple (*Acer rubrum*)
Aspens (*Populus grandidentata, P. tremuloides*)
Paper Birch (*Betula papyrifera*)
Beech (*Fagus grandifolia*)
Sugar Maple (*Acer saccharum*)
White Ash (*Fraxinus americana*)
Oaks (*Quercus rubra, Q. alba, Q. macrocarpa*)

Shrubs

Hop Hornbeam (*Ostrya virginiana*)
Ironwood (*Carpinus caroliniana*)
Spicebush (*Lindera benzoin*)

Herbs

Cinnamon Fern (*Osmunda cinnamomea*)
Sensitive Fern (*Onoclea sensibilis*)
Spinulose Wood Fern (*Dryopteris spinulosa*)

- **Terrestrial System - Non-Forested Covertypes (Moderately Disturbed)**

(SU) - Successional Shrubland - This covertype is similar to the successional old field, but is somewhat farther along successionally (i.e., farther removed in time from maintenance). Shrubs and young trees/saplings make up more than 50 percent of the areal cover. Forbs and grasses are present, but make up less than 50 percent of the areal cover. It is similar to the successional shrubland covertype of Reschke (1990) and is found throughout the base. A small zone of this covertype occurs just west of SS-034. Dominant plant species include:

Shrubs

Black Chokeberry *(Aronia prunifolia)*
Dogwoods *(Cornus amomum, C. racemosa)*
Northern Arrowwood *(Viburnum recognitum)*
Common Blackberry *(Rubus allegheniensis)*
Roses *(Rosa carolina, R. multiflora)*
Glossy Buckthorn *(Rhamnus frangula)*
Sumacs *(Rhus typhina, R. glabra)*

Small Trees/Saplings

White Ash *(Fraxinus americana)*
Aspens *(Populus tremuloides, P. grandidentata)*
Soft Maples *(Acer rubrum, A. negundo)*
Paper Birch *(Betula papyrifera)*

Herbs

Goldenrods *(Solidago nemoralis, S. altissima, S. canadensis)*
Kentucky Bluegrass *(Poa pratensis)*
Kentucky Fescue *(Festuca arundinacea)*
Quackgrass *(Agropyron repens)*
Timothy *(Phleum pratense)*
Orchard Grass *(Dactylis glomerata)*
New England Aster *(Aster novae-angliae)*
Common Evening Primrose *(Oenothera biennis)*
Wild Carrot *(Daucus carota)*
Ragweed *(Ambrosia artemisiifolia)*

(DM) - Dry Meadow - This covertype, maintained by periodic mowing or brush-hogging (generally at least annually), is dominated by various non-hydrophytic forbs and grasses. Young shrubs and seedlings/saplings may be present, but are only minor components of the community and are periodically cut back. This covertype contains various elements of the successional old field, cropland/field crops, and pastureland covertypes of Reschke (1990). It is found primarily along the western periphery of the base, interspersed with mixed hardwood forest. An example of this covertype is found west and southwest of SS-034. Dominant plant species include:

Herbs

Goldenrods *(Solidago nemoralis, S. altissima, S. canadensis)*
Bluegrasses *(Poa pratensis, P. compressa)*
Kentucky Fescue *(Festuca arundinacea)*
Quackgrass *(Agropyron repens)*
Timothy *(Phleum pratense)*
Orchard Grass *(Dactylis glomerata)*
New England Aster *(Aster novae-angliae)*

Common Evening Primrose *(Oenothera biennis)*
Wild Carrot *(Daucus carota)*
Ragweed *(Ambrosia artemisiifolia)*

Young Shrubs

Northern Arrowwood *(Viburnum recognitum)*
Common Blackberry *(Rubus allegheniensis)*
Multiflora Rose *(Rosa multiflora)*

Saplings/Seedlings

White Ash *(Fraxinus americana)*
Aspens *(Populus tremuloides, P. grandidentata)*
Red Maple *(Acer rubrum)*

- **Terrestrial System - Non-Forested Covertypes (Highly Disturbed)**

(IS) - Unvegetated Impervious Surfaces - This covertype includes paved surfaces (e.g., roads, parking lots, runway, etc.) and building exteriors. These surfaces are impervious to precipitation and possess artificial drainage systems (i.e., gutters, storm sewers, etc.). Vascular plants are only minor, incidental components of this covertype, which is found throughout the base.

(ML) - Mowed Lawn - This covertype is mapped in areas of lawn grasses maintained by regular mowing. Trees and shrubs may be present, but make up less than 30 percent of the cover. This covertype can be found throughout the base. It includes areas to the east of the runway.

(PS) - Unvegetated Permeable Surfaces - This covertype includes a multitude of areas where vegetation has been removed, but the surface has not been paved or sealed. Examples include abandoned sand pits and railroad beds. Vascular plants are only minor, incidental components of this covertype and are similar to the sand mine and construction/road maintenance spoils covertypes of Reschke (1990). An example of this covertype is the Delaware & Hudson Railroad tracks west of the site.

Protected wetlands in the vicinity of SS-034 are also shown in Figure 3-2. U.S. Army Corps of Engineers (USACE) identified wetland areas to the south and west of SS-034 (USACE 1992). Dominant covertypes within these wetlands are Mixed Hardwoods Swamp (HS) and Wet Meadow (WM). No NYSDEC-regulated wetlands were found within 1,000 feet of the site. Other wetlands identified on the base and details of base wetland resources are described in the basewide Wetland Delineation Report (URS 1994b).

3.4 Soil Characteristics

Soils at and in the vicinity of SS-034 have been mapped by the Soil Conservation Service (SCS) as Pipestone loamy sand, Junius loamy fine sand, and Grattan loamy sand (USDA-SCS undated). However, the descriptions of these mapping units were not consistent with field data collected from site borings. Consultation with a SCS representative from the Plattsburgh field office led to the conclusion that the SS-034 soils are most likely classifiable as Shaker fine sandy loam. The *Soil Survey of Plattsburgh AFB* notes that

inclusions, including Shaker soils, may make up 15 percent of a Pipestone map unit and may range up to 5 acres in size.

Site soils are generally deep with a moderately to rapidly draining fine sandy loam solum and a poorly drained silty clay substratum. These soils formed in loamy over clayey unconsolidated glaciomarine and glaciolacustrine deposits. Soil unit designations and descriptions are provided in Table 3-1.

3.5 Geologic Setting

Stratigraphy encountered during the SS-034 SI consisted of a thin silty sand surface layer underlain by a thicker silty clay unit. Stratigraphic information from the two deepest SI borings was used to construct a geologic cross-section for the site. This cross-section, located on Figure 3-3, is shown on Figure 3-4. Table 3-2 summarizes geotechnical information. Since the SI borings only partially penetrated the silty clay unit, stratigraphic information from other investigations will be incorporated into the discussion of the geology near SS-034 (Malcolm Pirnie 1993).

The very permeable surface sand unit found throughout most of the base is absent at SS-034. Instead, there is a dark brown silty sand unit that ranges from 1 to 3 feet in thickness. Groundwater was not encountered in this unit. This unit is found at similar thicknesses and elevations at nearby site SS-007 (approximately 1,000 feet west of SS-034) and near piezometer cluster PZ-8 (2,000 feet northwest of SS-034) (Figure 3-5).

A gray silty clay unit lies beneath the silty sand unit. This unit was found to be at least 17 feet thick at boring location MW-34-001. The upper few feet of the unit has orange mottles and a well-developed angular blocky structure and is quite firm. At a depth of 6 to 7 feet, the unit becomes moist and plastic, and the mottling and blocky structure disappears. The unit was wet at an 11-foot depth at boring location MW-34-001, but this water did not appear to be mobile. Minimal water accumulated in temporary well MW-34-001, which was screened in the wet portion of the silty clay. The total thickness of the silty clay could not be determined from the SI borings, but this unit was approximately 15 feet thick at piezometer cluster PZ-8 and was underlain by glacial till. The silty clay acts as a confining layer.

Glacial till overlies bedrock at piezometer cluster PZ-8 and was described as a poorly-sorted gray silt and clay matrix with frequent gravel, cobbles, and boulders (Malcolm Pirnie 1993). The till was reported to be 112 feet thick in boring PZ-8D.

Bedrock was encountered at a depth of 137 feet (18 feet elevation above mean sea level) in PZ-8D and was described as thinly, horizontally to subhorizontally, bedded dolostone (Figure 3-5). Bedrock outcrops approximately 1,000 feet east of SS-034 near Route 9. Geophysical survey data indicates the presence of a fault zone west of SS-034, so the depth to bedrock beneath SS-034 currently is uncertain.

3.6 Hydrogeologic Setting

Groundwater in the Plattsburgh area generally occurs in both the overburden deposits and bedrock. The Adirondack Mountains to the west of Plattsburgh represent the major recharge area for the region and Lake Champlain represents the regional discharge area (Giese and Hobba 1970). Other locally significant

TABLE 3-1

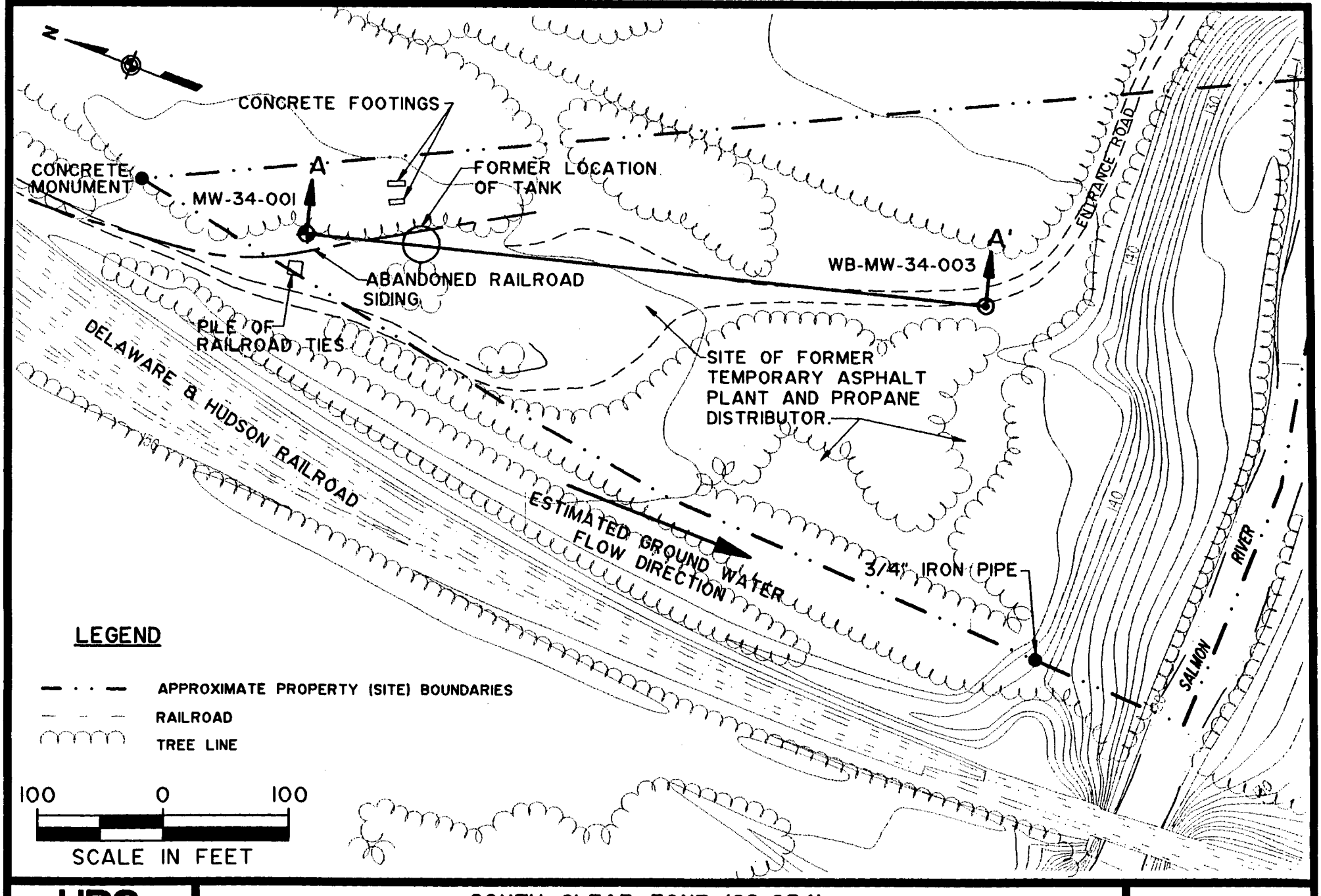
SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
SOIL SERIES DESIGNATIONS

Soil Unit No.	Soil Series	Description
33	Pipestone Loamy Sand	Very deep, somewhat poorly drained soil formed in low to medium lime glacial outwash material on nearly level lake plains, terraces, and outwash plains.
45A	Junius Loamy Fine Sand	Very deep, somewhat poorly drained soil formed in medium to high lime glacial outwash material on nearly level terraces, deltas, and outwash plains.
181B	Grattan Loamy Sand	Very deep, excessively drained soil formed in low lime glacial outwash material on gently sloping deltas, terraces, and outwash plains.
48A	Shaker Fine Sandy Loam	Deep, moderately to poorly drained soils formed in loamy over clayey glaciomarine and glaciolacustrine deposits.

Source: *Soil Survey of Plattsburgh Air Force Base, NY* (USDA-SCS, undated).

AC-7582

J:\35291.21\CAD\SS034\ 1=100 10/3/97-3 BJG



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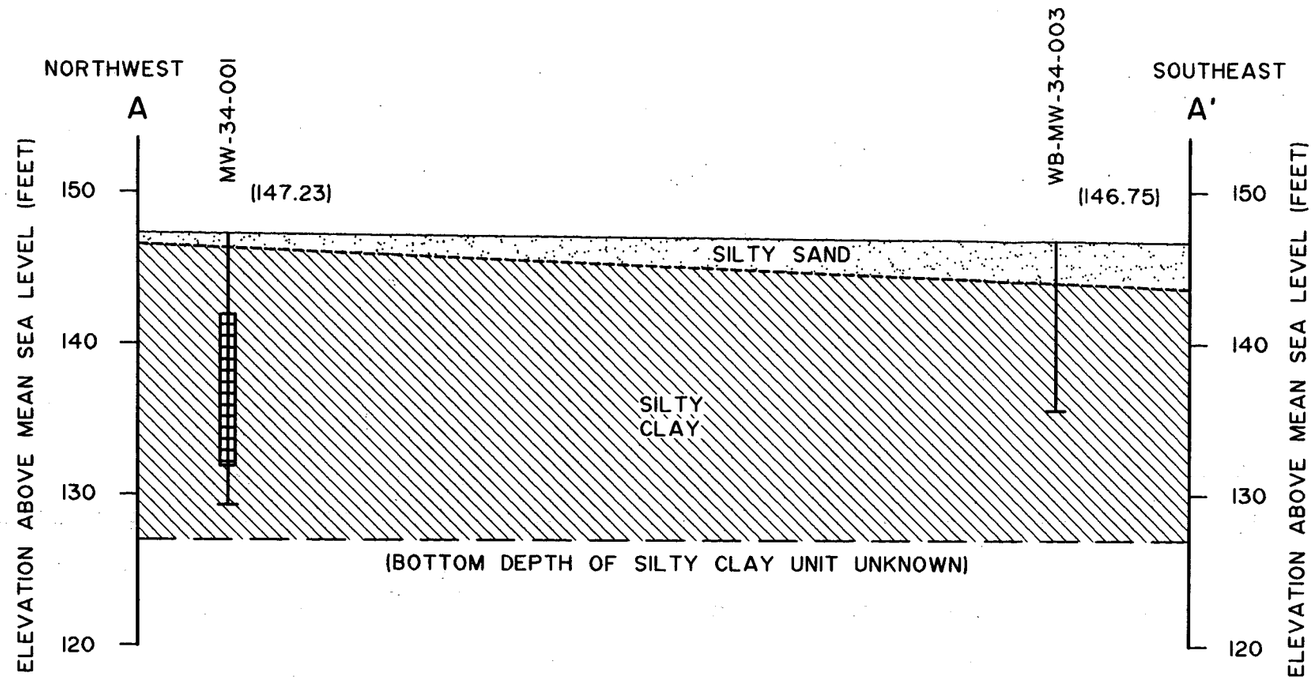
SOUTH CLEAR ZONE (SS-034)
CROSS SECTION A-A' LOCATION MAP

FIGURE 3-3



NOTES:

1. GEOLOGICAL CONDITIONS SHOWN ARE REPRESENTATIVE OF THE CONDITIONS ENCOUNTERED AT EACH BORING LOCATION TO THE DEPTH DRILLED. EXTRAPOLATIONS BETWEEN BORINGS HAVE BEEN INTERPRETED USING STANDARDLY ACCEPTED GEOLOGIC PRACTICES AND PRINCIPLES. ACTUAL CONDITIONS MAY VARY BETWEEN BORINGS FROM THOSE SHOWN.
2. ELEVATIONS BASED ON TRANSVERSE MERCATOR PROJECTION, EAST ZONE, NORTH AMERICAN DATUM 1983.
3. WELL MW-34-001 HAD LESS THAN ONE FOOT OF RECHARGE AFTER 24 HOURS AND WAS THEREFORE ABANDONED.

LEGEND

SILTY SAND

SILTY CLAY, TRACE SAND

MW-34-001 — MONITORING WELL NUMBER

(268.00) — GROUND SURFACE ELEVATION

SCREENED INTERVAL OF MONITORING WELL

BOREHOLE TERMINATION

VERTICAL EXAGGERATION = 10X

100 0 100

HORIZONTAL SCALE IN FEET

SOUTH CLEAR ZONE (SS-034)
CROSS SECTION A-A'

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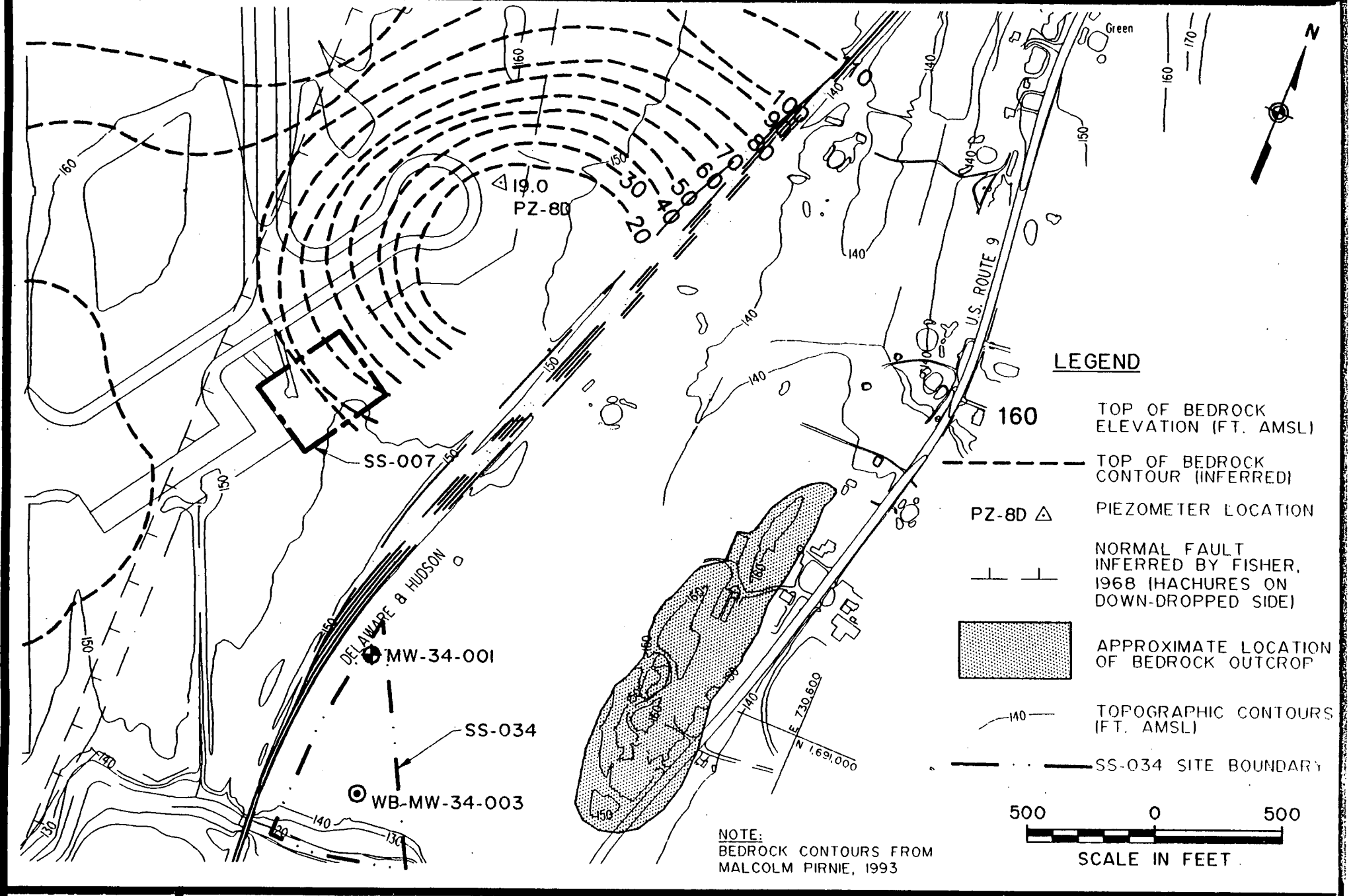
FIGURE 3-4

TABLE 3-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
GEOTECHNICAL ANALYSIS SUMMARY

	GRAIN SIZE DISTRIBUTION				USCS Class	Water Content	Permeability (Vertical/cm/s)
Sample Location/Depth	% Gravel	% Sand	% Silt	% Clay			
WB-MW-34-001/2' - 4'	0.0	45	55		CL*	18.7	--
WB-MW-34-001/6 '- 8'	0.0	3	97		CH*	37.8	--
WB-MW-34-001/10' - 12'	3.8	22.6	21.3	52.3	CL*	28.9	3.10×10^{-8}
WB-MW-34-001/16 '- 18'	13	32	55		CL*	11.8	--
WB-MW-34-003/0' - 2'	33	57	10		SM	5.2	--
WB-MW-34-003/7' - 9'	0.0	5.4	18.2	76.4	CH*	34.8	2.86×10^{-7}
SB-34-007/0' - 2'	12	74	14		SM	11.7	--

* Determined from Atterberg Limits Analysis



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BEDROCK INFORMATION NEAR SS-034

FIGURE 3-5

discharge areas include the Saranac and Salmon Rivers. The Salmon River, located immediately adjacent to the southern perimeter of SS-034, is classified as a Class C (T) stream. The symbol (T) indicates that the designated waters are trout waters and that a dissolved oxygen content specification is available. The river originates approximately 20 miles west of the base in the Adirondack Mountains. No discharge measurements are available for this river.

Groundwater was not encountered in the surficial silty sand unit. This may be because the SI field work was conducted during the drier fall season. The hydraulic conductivity of the silty sand was not determined during the SI, but previous investigative work at Plattsburgh AFB and published values indicate that the silty sand would have a hydraulic conductivity in the 10^{-5} to 10^{-3} centimeters per second (cm/sec) range (Malcolm Pirnie 1993; Freeze and Cherry 1979). Since the hydraulic conductivity of the silty sand unit is likely two to three orders of magnitude higher than the underlying units, horizontal groundwater flow should occur in this unit during wetter periods. Based on the dip of the silty clay unit (i.e., toward the Salmon River), groundwater flow during wetter periods is probably toward the Salmon River (Figure 3-4).

The silty clay unit forms a confining layer that separates the surficial silty sand unit from the underlying till and bedrock aquifer. The vertical hydraulic conductivity of the silty clay is estimated to be in the 10^{-8} to 10^{-7} cm/sec range based on the geotechnical analysis of two onsite Shelby tube samples (Table 3-2).

Groundwater flow in the till and bedrock aquifer beneath Plattsburgh AFB has been only cursorily investigated. Eight bedrock wells/piezometers were installed by Malcolm Pirnie as part of the basewide hydrogeology investigation. Data from April 1993 indicated that groundwater flow in the shallow bedrock aquifer was to the east and southeast, toward Lake Champlain and the Salmon River, at a horizontal gradient of approximately 0.007 feet/feet (Malcolm Pirnie 1993). Slug tests performed on the bedrock wells yielded hydraulic conductivities ranging from 10^{-6} to 10^{-2} cm/sec.

4.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The National Oil and Hazardous Substance Pollution Contingency Plan (40 CFR 300) requires that the selection of remedial actions at CERCLA sites meet applicable or relevant and appropriate requirements (ARARs) of federal and state environmental laws and regulations (USEPA 1990a). The process of identifying ARARs begins during the scoping of the investigation and can continue through the remedial design phase. ARARs identification is always site-specific.

4.1 Definition of ARARs and TBCs

A requirement of federal or state law may be either "applicable" or "relevant and appropriate".

Applicable requirements are those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance or contaminant, a remedial action, location, or other circumstances at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance or contaminant, a remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site.

In addition to promulgated standards and controls, other requirements are "to be considered (TBC)". TBCs are federal and state policies, advisories, and other non-promulgated health and environmental criteria, including numerical guidance values, that are not legally binding. TBCs are used for the protection of public health and the environment if no specific ARARs for a chemical or other site condition exist, or if ARARs are not deemed sufficiently protective. ARARs are divided into the following three categories, although many categories may overlap.

Location-specific requirements, discussed in Section 4.2, pertain to existing natural or cultural features at the site that are specifically protected. These may affect contaminant levels or implementation of remedial actions.

Chemical-specific requirements are numerical values or methodologies which result in the establishment of numerical values for the acceptable amount of a chemical in the environment. Chemical-specific requirements are addressed in detail in Section 4.3 of this report.

Action-specific requirements pertain to the proposed site remedies and govern implementability of the selected site remedy. Action-specific ARARs generally set performance or design standards, controls, or restrictions on particular types of activities. These generally are addressed in a feasibility study.

4.2 Location-specific ARARs

The following location-specific ARARs were evaluated in relation to the SS-034 site.

4.2.1 Natural Features

National Environmental Policy Act of 1969 (NEPA)

The Department of the Air Force has revised its regulations to update the Air Force process for compliance with NEPA. The final rule for the Environmental Impact Analysis Process (32 CFR Part 989) was published in the January 24, 1995 *Federal Register*. This revision provides policy and guidance for consideration of environmental matters in the Air Force decision-making process. It implements the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and 32 CFR Part 188 (Department of Defense Directive 6050.1, Environmental Effects in the United States of Department of Defense Actions).

The Air Force's position on CERCLA-consistent response actions, with respect to the requirements of NEPA, is that the CERCLA response process can satisfy the requirements of NEPA by addressing potential impacts of remedial actions on human health and the environment (USAF 1992). Installations have the option to prepare separate NEPA- and CERCLA-consistent restoration documentation, but an attempt is made to:

- Integrate NEPA and CERCLA documentation whenever possible
- Use the community involvement element of the CERCLA process to address impacts of remedial actions
- Evaluate potential environmental impacts the response action may have on natural resources
- Reflect any potential impacts from anticipated CERCLA response actions in the disposal/reuse Environmental Impact Statement

32 CFR Part 989 also sets forth policy for compliance with Executive Orders #11988 and #11990 on Floodplain Management and Wetlands Protection. These require that a remedial alternative located in a floodplain or in a wetland not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of floodplains (e.g., reduction and control of flood hazard, replenishment of groundwater, soil conservation, and conservation and long-term productivity of existing flora and fauna).

Section 404 of the Clean Water Act and related regulations (40 CFR 230) protect waters of the United States, including wetlands, and prohibit the deposition of dredged or excavated materials. Protection of aquatic and wetland habitats is a primary goal of this program. Remedial activities that affect these habitats may include capping, stream channelization, and dewatering of the site [See 33 CFR 320-330 for United States Army Corps of Engineers (USACE) permit regulations].

New York State Use and Protection of Waters (6 NYCRR 608) establishes a permit program to protect certain classes of New York State waterways. Stream disturbances must be avoided, or adverse impacts must be mitigated through terms and conditions of the joint permitting process between the NYSDEC and USACE regulating waters of the United States. Protected streams included Class A, B, and C (T). The nearby Salmon River is a class C (T) waterbody.

New York State Fish and Wildlife Regulations (6 NYCRR 182) and the federal Endangered Species Act (16 USC 1531) list and protect endangered or threatened species from actions that may threaten their existence or modify their habitats. Rare and endangered plant species also are protected in New York State by regulations in 6 NYCRR 193. The species databases with location-specific information are kept by the United States Fish and Wildlife Service and the New York State Heritage Program, housed in the NYSDEC.

Fish and Wildlife Coordination Act (16 USC 661), a federal law, requires the protection of fish and wildlife from actions which would affect or modify wildlife habitat.

New York State Water Quality Classifications (6 NYCRR 701-703) is a system in which NYSDEC classifies groundwater, streams, and other water bodies. In Classes A, B, C, and D, fresh surface waters are pre-identified and their best uses, ranging from fishing to drinking, are protected with ambient water quality criteria.

New York State Floodplain Management Act and Regulations (ECL Article 36, and 6 NYCRR 500) regulates activities taking place on floodplains. Although Plattsburgh AFB was not classified on Federal Emergency Management Agency (FEMA) flood insurance maps, nearby off-base floodplain mapping indicates SS-034 to be above the 100-year floodplain boundary (FEMA 1979).

4.2.2 Cultural Features

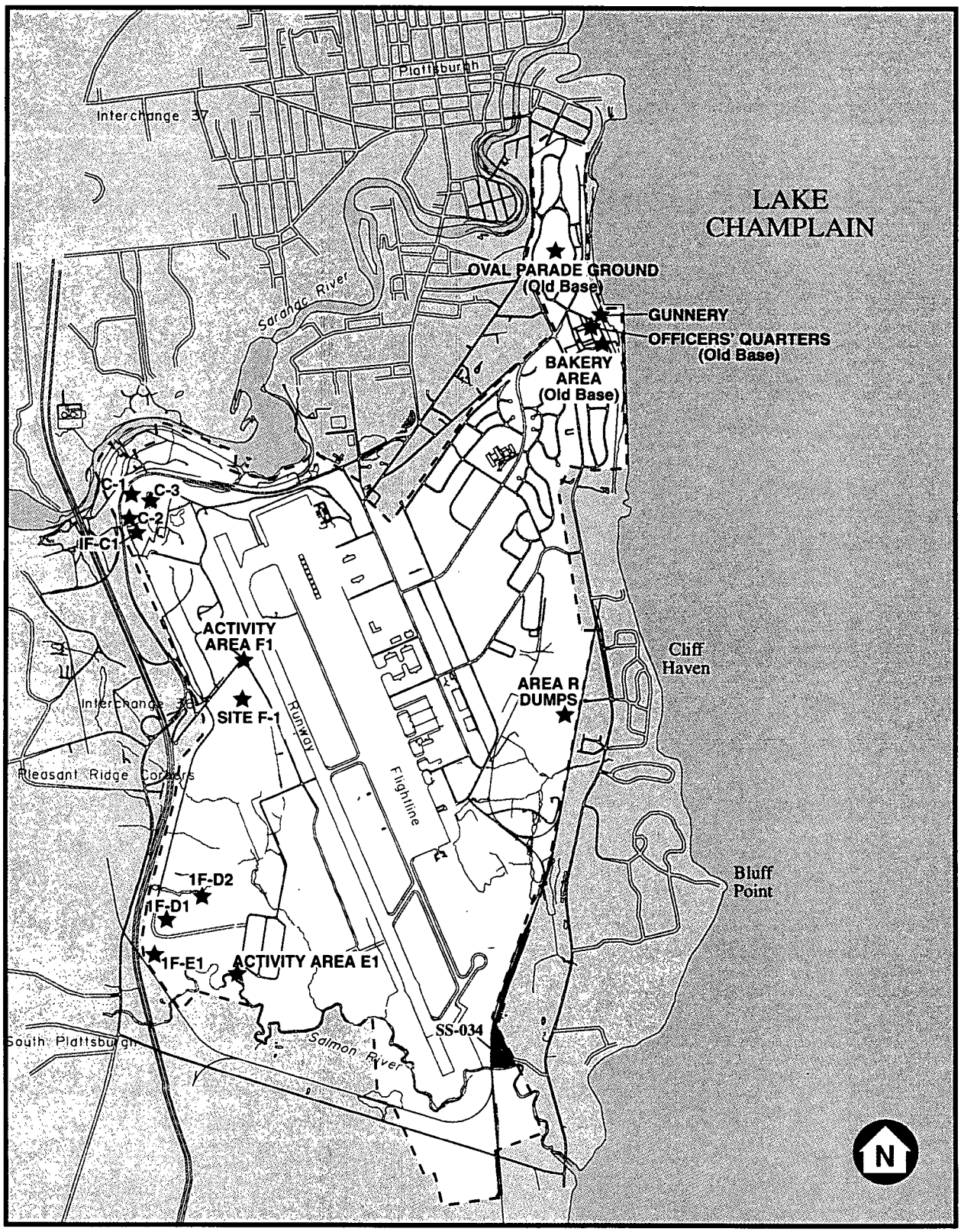
National Historic Preservation Act (16 USC 470) (NHPA) is a federal law that establishes the responsibilities of federal agencies with respect to "historic properties" which include objects from both prehistory and history, it covers a range of properties from standing structures to discrete artifacts recovered from archaeological excavations. This federal law also protects properties listed on, or eligible for inclusion on, the National Register of Historic Places (NRHP). Archaeological finds that are considered eligible for inclusion on the NRHP also are protected by this act. The New York State Historic Preservation Office lists all federal- and state-protected properties. This office has determined that investigation and general remedial activities at Plattsburgh AFB will not adversely affect existing historic properties.

An archaeological survey report for Plattsburgh AFB was completed in November 1994 by the United States Army Construction Engineering Research Laboratories/Technical Assistance Center (USACERL/TAC 1994). The purpose of the survey was to complete the inventory of prehistoric and historic archaeological sites on base, as required by the National Historic Preservation Act, Section 110. According to the survey, no archaeological sites were identified within 1,000 feet of SS-034 (Figure 4-1).

Archaeological and Historic Preservation Act (16 USC Section 469). This act provides for the protection of archaeological data that might be lost as a result of a federal construction project. In contrast to the National Historic Preservation Act, this law allows for only the preservation of the data and not the site itself.

PLATTSBURGH AFB

Sites Identified During Archaeological Survey



2000 0 2000
SCALE IN FEET

LEGEND

- Base Boundary
- IRP Site
- ★ Areas Showing Evidence of Cultural Remains or Past Activities

Figure 4-1

4.3 Chemical-specific ARARs

Numerical standards have been developed for soil at the SS-034 site through the evaluation of the ARARs and TBCs. Table 4-1 and the tables in Appendix A present these numerical standards, which are compared to analytical data in Section 5.0

Federal and state laws and regulations have not promulgated standards for soil contaminants other than for hazardous waste characterization. However, the NYSDEC has established soil cleanup objectives in its document entitled, "Determination of Soil Cleanup Objectives and Cleanup Levels" (NYSDEC 1994). The NYSDEC cleanup objectives for organic compounds are based on the soil to water partition theory model. They represent the maximum concentration of a particular organic compound that may be in soil and not produce groundwater contamination greater than groundwater standards.

NYSDEC cleanup objectives for metals are based upon published average concentrations detected in Eastern United States soils. The NYSDEC permits the use of "site background" data for metals, if this data is available. A basewide background surface soil and groundwater survey was performed in late 1994, primarily to establish background inorganic constituent concentrations in Plattsburgh AFB soils (URS 1995c). The 95 percent Upper Tolerance Limits calculated for each inorganic constituent detected in the background soil samples will be considered as "site background" metals concentrations and appropriate for use as soil TBCs. Resource Conservation and Recovery Act (RCRA) hazardous waste toxicity characteristic limits established by 40 CFR 261 are considered soil ARARs.

TABLE 4-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Soil	
		TBC Value (µg/kg)	Source
Phenol	SVOC	30	A
bis(2-Chloroethyl)ether	SVOC		
2-Chlorophenol	SVOC	800	A
1,3-Dichlorobenzene	SVOC	1,600	A
1,4-Dichlorobenzene	SVOC	8,500	A
1,2-Dichlorobenzene	SVOC	7,900	A
2-Methylphenol	SVOC	100	A
Bis(2-chloroisopropyl)ether	SVOC		
4-Methylphenol	SVOC	900	A
N-Nitroso-di-n-propylamine	SVOC		
Hexachloroethane	SVOC		
Nitrobenzene	SVOC	200	A
Isophorone	SVOC	4400	A
2-Nitrophenol	SVOC	330	A
2,4-Dimethylphenol	SVOC		
Bis(2-chloroethoxy)methane	SVOC		
2,4-Dichlorophenol	SVOC	400	A
1,2,4-Trichlorobenzene	SVOC	3,400	A
Naphthalene	SVOC	13,000	A
4-Chloroaniline	SVOC	220	A
Hexachlorobutadiene	SVOC		
4-Chloro-3-methylphenol	SVOC	240	A
2-Methylnaphthalene	SVOC	36,400	A
Hexachlorocyclopentadiene	SVOC		
2,4,6-Trichlorophenol	SVOC		
2,4,5-Trichlorophenol	SVOC	100	A
2-Chloronaphthalene	SVOC		
2-Nitroaniline	SVOC	430	A
Dimethylphthalate	SVOC	2,000	A
Acenaphthylene	SVOC	41,000	A
2,6-Dinitrotoluene	SVOC	1,000	A

TABLE 4-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CHEMICAL-SPECIFIC ARARs/TBCs

PARAMETER	Class	Soil	
		TBC Value (mg/kg)	Source
Aluminum	MET	8510	SB
Antimony	MET	12.6	SB
Arsenic	MET	7.5	A
Barium	MET	300	A
Beryllium	MET	0.74	SB
Cadmium	MET	1.3	SB
Calcium	MET	30200	SB
Chromium	MET	19.5	SB
Cobalt	MET	30	A
Copper	MET	44.1	SB
Iron	MET	36700	SB
Lead	MET	79.4	SB(2)
Magnesium	MET	3340	SB
Manganese	MET	474	SB
Mercury	MET	0.1	A
Nickel	MET	13	A
Potassium	MET	929	SB
Selenium	MET	2	A
Silver	MET	ND	SB
Sodium	MET	520	SB
Thallium	MET	ND	SB
Vanadium	MET	150	A
Zinc	MET	63.4	SB

TABLE 4-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CHEMICAL-SPECIFIC ARARs/TBCs

NOTES:

(1) Applies to each isomer individually.
(2) Background levels for lead vary widely. Average levels in undeveloped rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200-500 ppm.

SOURCES:

A - NYSDEC Soil Cleanup Objectives and Cleanup Levels, TAGM HWR-94-4046, January 1994.

ABBREVIATIONS:

VOC - Volatile Organic Compound.
SVOC - Semivolatile Organic Compound.
MET - Metals.
SB - Site background from the "Background Surface Soil and Groundwater Survey for Plattsburgh Air Force Base", URS Consultants, Inc., 1995.
TBCs - To Be Considered (criteria that are not legally binding).

5.0 ANALYTICAL DATA SUMMARY

This section discusses the analytical data for soils collected at SS-034. Potential chemicals of concern at the site are derivatives of typical petroleum products stored and handled at a hot mix asphalt plant: No. 2 fuel oil, No. 2 diesel fuel, asphalt cement, and gasoline. The propane distributor reportedly used no degreasers at the site.

5.1 Soil

5.1.1 Previous Investigations

No previous investigations of soil, except the site walkover for the Preliminary Assessment, were conducted at SS-034.

5.1.2 Site Investigation

Ten discrete soil samples were collected at the eight boring locations shown on Figure 2-1. The samples were analyzed for TCL volatile and semivolatile organic compounds and TAL metals. Four organic compounds and 19 of the 23 TAL metals were detected in the soil samples. A summary of the analyses detected in the soil samples is presented in Table 5-1 and complete analytical data tables are provided in Appendix A.

Of the four organic compounds detected, two were solvents (acetone and 1,1,1-trichloroethane) and two were plasticizers (diethylphthalate and di-n-butylphthalate). None of the organic compound detections exceeded their respective TBC values. Acetone was detected in eight of the 10 soil samples collected, at a maximum concentration of 15 parts per billion (ppb). The frequent low level detections of acetone may be attributable to laboratory contamination, as acetone is a commonly used laboratory cleaning solvent.

1,1,1-Trichloroethane was detected in two samples taken from boring WB-MW-34-003. It was found at a concentration of 34 ppb in the 0- to 2-foot depth sample and at a concentration of 26 ppb in the 5- to 7-foot depth sample. This vertical concentration gradient may indicate the downward migration of a former solvent spill on the ground surface at this location.

The phthalate compounds were detected at a maximum concentration of 1,100 ppb in three samples from three separate locations. There was no apparent pattern to the phthalate detections and they may have been due to contamination introduced by the latex gloves worn by sampling and laboratory personnel.

Nineteen of the 23 TAL metals analyzed were detected in the soil samples, with 11 of the 19 detected metals being found at concentrations exceeding their respective TBC values (aluminum, beryllium, cadmium, chromium, iron, magnesium, manganese, nickel, potassium, sodium, and zinc). However, the TBC values for the majority of the exceeding metals were established using analytical data from background soil samples that were dominantly sands or loamy sands (URS 1995c). The parent materials for the soils used to establish the TBCs are glaciomarine and glaciolacustrine sands. The finer textured SS-034 silty sands would exhibit naturally higher concentrations of clay mineral forming elements as compared to soils formed in sandy parent materials. Specifically, the natural concentrations of aluminum, calcium, iron, magnesium, potassium, and

TABLE 5-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
ANALYTES DETECTED IN SOIL SAMPLES

ANALYTE		CLASS	TBC VALUE	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	AVERAGE CONCENTRATION OF DETECTIONS	LOCATION OF MAXIMUM DETECTION
Acetone	(µg/kg)	VOC	200	8 / 10	3	15	9	WB-MW-34-003-5 SB-34-04-0
1,1,1-Trichloroethane	(µg/kg)	VOC	800	2 / 10	26	34	30	WB-MW-34-003-0
Diethylphthalate	(µg/kg)	SVOC	7100	2 / 10	105	1100	603	WB-MW-34-003-5
Di-n-butylphthalate	(µg/kg)	SVOC	8,100	1 / 10	120	120	120	SB-34-05-0
Aluminum	(mg/kg)	METAL	8510 (SB)	10 / 10	2110	26300 [a]	7437	WB-MW-34-003-5
Arsenic	(mg/kg)	METAL	7.5 **	4 / 10	1.1	3.4	2.15	WB-MW-34-001-0
Barium	(mg/kg)	METAL	300 **	10 / 10	12	282	65	WB-MW-34-003-5
Beryllium	(mg/kg)	METAL	0.74 (SB)	9 / 10	0.05	1.2 [a]	0.36	WB-MW-34-003-5
Cadmium	(mg/kg)	METAL	1.3 (SB)	3 / 10	1.5	2 [a]	1.7	WB-MW-34-001-0
Calcium	(mg/kg)	METAL	30200 (SB)	10 / 10	729	7450	3259	WB-MW-34-003-5
Chromium	(mg/kg)	METAL	19.5 (SB)	10 / 10	2.9	55.7 [a]	15	WB-MW-34-003-5
Cobalt	(mg/kg)	METAL	30 **	10 / 10	1.8	27.4	7.86	WB-MW-34-003-5
Copper	(mg/kg)	METAL	44.1 (SB)	8 / 10	1.4	41.8	12.59	WB-MW-34-003-5
Iron	(mg/kg)	METAL	36700 (SB)	10 / 10	4460	40800 [a]	13215	WB-MW-34-003-5
Lead	(mg/kg)	METAL	79.4 (SB)	10 / 10	1.6	7	4.63	WB-MW-34-003-5
Magnesium	(mg/kg)	METAL	3340 (SB)	10 / 10	703	14400 [a]	3438	WB-MW-34-003-5
Manganese	(mg/kg)	METAL	474 (SB)	10 / 10	31.2	680 [a]	196	WB-MW-34-003-5
Nickel	(mg/kg)	METAL	13 **	10 / 10	2.3	50.9 [a]	13.49	WB-MW-34-003-5
Potassium	(mg/kg)	METAL	929 (SB)	10 / 10	265	6830 [a]	1542.8	WB-MW-34-003-5
Selenium	(mg/kg)	METAL	2 **	3 / 10	0.82	1.7	1.27	WB-MW-34-003-5
Sodium	(mg/kg)	METAL	520 (SB)	10 / 10	157	940 [a]	319	WB-MW-34-003-5
Vanadium	(mg/kg)	METAL	150 **	10 / 10	6.4	69.3	21.0	WB-MW-34-003-5
Zinc	(mg/kg)	METAL	63.4 (SB)	8 / 8	16.6	110 [a]	42.1	WB-MW-34-003-5

TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

[a] - Exceeds TBC.

SB - Site Background. (95% Upper Tolerance Limit Value from " Background Surface Soil & Groundwater Survey for Plattsburgh Air Force Base", URS 1995)

**- NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

sodium can be expected to be higher in the finer textured (clayey) soils of SS-034. Any TBC exceedances for these metals likely indicate natural differences in soil elemental composition rather than soil contamination resulting from past site activities. Table 5-2 shows a comparison of the average inorganic analyte concentrations detected in SS-034 soil samples versus in the background surface soil survey samples used to establish many TBC values. Also, the highest onsite concentrations for nearly every detected metal (except arsenic and cadmium) occurred in the 5- to 7-foot depth silty clay sample from boring WB-MW-34-003.

Beryllium, chromium, nickel, and zinc were detected in essentially all the soil samples. Each of these metals was detected at concentrations that exceeded their respective TBC values in from one to four samples. However, the TBC exceedances were minor (by less than one order of magnitude) and again, likely represent natural differences in soil elemental composition rather than soil contamination.

Cadmium was detected in three of the 10 soil samples at concentrations ranging from 1.5 to 2 ppb. All these detections exceeded the 1.3 ppb TBC value and may be indicative of past petroleum-related spills. However, it is again more likely that the TBC exceedances represent compositional differences in the SS-034 soils as compared to the sandier background survey soils.

During the SI field investigative program, there were no visually apparent or instrumentally detected indicators of petroleum-related spills at SS-034. The analytical data from the soil samples collected at the site also did not show evidence of compounds indicative of petroleum-related contamination. Slightly elevated metals concentrations, as compared to background soil samples from other areas of the base, are likely attributable to the higher clay content in the SS-034 soils rather than to contamination from past activities at the site.

5.2 Tentatively Identified Compounds

Tentatively identified compounds (TICs) are non-target compounds that may be present in a sample. The mass spectrum of an unknown peak in a sample is compared to a computer library of mass spectral data in an effort to identify it. Compounds identified in this manner are referred to as TICs, since an analytical standard has not been analyzed and, therefore, the identification is only tentative. Quantitations associated with TICs are considered gross estimates of concentrations present and easily could be in error by several orders of magnitude (IEA 1994).

The only volatile organic TIC detected was in sample SB-34-08-0, which was tentatively identified as a terpene isomer at a concentration of 13 ppb.

Seven to 21 semivolatile organic TICs were detected in each of the soil samples at estimated concentrations of up to 40,000 ppb. Most TIC detections were unidentifiable (e.g., unknown, unknown acid, unknown carboxylic acid, unknown hydrocarbon, unknown oxygenated hydrocarbon). Aldol condensation product, a remnant of the soil extraction/sample preparation process, was identified in every sample at estimated concentrations of up to 40,000 ppb. Aldol condensation product usually had the highest TIC concentration in each sample. The only other compound that was more positively identified was benzoic acid at an estimated concentration of 220 ppb in WB-MW-34-003-0.

TABLE 5-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
COMPARISON OF INORGANIC ANALYTES DETECTED IN
SS-034 SOILS AND BACKGROUND SURFACE SOIL SURVEY SOILS

ANALYTE	CLASS	TBC VALUE (mg/kg)	SS-034 SI SAMPLES		BACKGROUND SURFACE SOIL SURVEY SAMPLES	
			FREQUENCY OF DETECTION	AVERAGE CONCENTRATION OF DETECTIONS (mg/kg)	FREQUENCY OF DETECTION	AVERAGE CONCENTRATION OF DETECTIONS (mg/kg)
Aluminum	METAL	8510 (SB)	10 / 10	7437	25 / 25	3156
Arsenic	METAL	7.5 **	4 / 10	2.15	15 / 26	1.37
Barium	METAL	300 **	10 / 10	65	26 / 26	27.7
Beryllium	METAL	0.74 (SB)	9 / 10	0.36	22 / 25	0.23
Cadmium	METAL	1.3 (SB)	3 / 10	1.7	1 / 26	1.3
Calcium	METAL	30200 (SB)	10 / 10	3259	25 / 25	4685
Chromium	METAL	19.5 (SB)	10 / 10	15	26 / 26	7.45
Cobalt	METAL	30 **	10 / 10	7.86	23 / 25	3.36
Copper	METAL	44.1 (SB)	8 / 10	12.59	23 / 25	9.27
Iron	METAL	36700 (SB)	10 / 10	13215	25 / 25	10041
Lead	METAL	79.4 (SB)	10 / 10	4.63	26 / 26	23.42
Magnesium	METAL	3340 (SB)	10 / 10	3438	25 / 25	996
Manganese	METAL	474 (SB)	10 / 10	196	25 / 25	139
Nickel	METAL	13 **	10 / 10	13.49	22 / 25	6.65
Potassium	METAL	929 (SB)	10 / 10	1542.8	23 / 25	364
Selenium	METAL	2 **	3 / 10	1.27	1 / 26	1.65
Sodium	METAL	520 (SB)	10 / 10	319	14 / 25	154
Vanadium	METAL	150 **	10 / 10	21.0	25 / 25	22.6
Zinc	METAL	63.4 (SB)	8 / 8	42.1	25 / 25	27.4

TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

SB - Site Background. (95% Upper Tolerance Limit Value from " Background Surface Soil & Groundwater Survey for Plattsburgh Air Force Base", URS 1995)

**- NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

It should be noted that up to 13 semivolatile organic TICs were detected in the soil method blanks, indicating that many TICs could be laboratory contaminants. Based on the ambiguous and suspect nature of these results, TICs do not warrant further consideration at SS-034.

6.0 HUMAN HEALTH RISK ASSESSMENT

6.1 Introduction

6.1.1 Objectives and Scope

This human health risk assessment (HRA) is an analysis of the potential adverse health effects caused by contaminants resulting from activities at SS-034 in the absence of remedial measures. As such, it may be classified as a no-action, or "baseline" health risk assessment. The HRA quantitatively assesses human risk under current and potential future site conditions, and is considered an integral part of the SI for SS-034. It uses data and information collected during the SI to assess human health risk in the immediate and surrounding area, and serves as one of the principal criteria for determining whether remedial action is required at the site.

The HRA for SS-034 follows the general format and procedures set forth in the USEPA's *Risk Assessment Guidance for Superfund (RAGS)* (USEPA 1989a) and consists of the following six components:

1. Data Evaluation
2. Hazard Identification
3. Exposure Assessment
4. Toxicity Assessment
5. Risk Characterization
6. Uncertainty Analysis

These components are presented sequentially in Sections 6.2 through 6.8 and summarized in Section 6.9.

6.1.2 Site Background

SS-034, approximately 4 acres in size, is located in the southern portion of the base next to Route 9 and southeast of the runway taxiway (Figure 1-2). It is heavily vegetated and surrounded by forested areas.

Prior to 1980, the site was a privately owned parcel reportedly used to stage an asphalt batch plant and then as a storage facility for a propane distributor. Typical products used at an asphalt batch plant include No. 2 fuel oil, No. 2 diesel oil, asphalt cement, and gasoline. However, there are no records of the use of these products at SS-034. The USAF acquired the property in the early 1980s and demolished the existing structures, thereby exposing an underground tank which appeared to be a septic tank. The tank was unearthed, but the excavation remains open (surrounded by barricade fencing) and the tank remains on site. No evidence of contaminated soil was noted during the SI field activities.

Silty sand overlies a minimally 17-foot-thick silty clay confining unit which is 1 to 3 feet below ground surface. No groundwater was detected in the silty sand unit. Groundwater would presumably flow south and discharge to the Salmon River. No seeps were observed near the river.

6.2 Data Evaluation

The HRA performed for SS-034 is based on the analytical results of environmental media sampled during this SI, as described in Section 5.0. Data collected as part of this investigation were collected in accord-

ance with the approved *Chemical Data Acquisition Plan (CDAP)* (Malcolm Pirnie 1992c). Minor deviations from this plan were made in response to site-specific circumstances, following consultation and approval from Air Force Base Conversion Agency (AFBCA) and are discussed in detail in Section 2.0. Section 5.0 of this report identifies the number and types of samples collected from each site.

Data validation was performed by environmental chemists under the supervision of URS' Project Chemical QA/QC Task Leader. The data were reviewed against the appropriate method and USEPA's *Contract Laboratory Program (CLP) Organic Data Review, SOP No. HW-6, Revision #8* and, *Evaluation of Metals Data for the Contract Laboratory Program* based on *SOW 3/90, Revision XI.* All deliverables were in accordance with the approved *CDAP.* The validation summary tables and all definitions of data qualifiers are presented in Appendix D.

The data evaluation process followed the guidelines outlined in *RAGS* (USEPA 1989a) and *Guidance for Data Usability in Risk Assessment* (USEPA 1990c). Steps in determining the usability of data in the HRA include comparing site data with method blanks, and evaluating the data qualifiers and reported detection limits. The following subsections discuss the usability of the data collected during this investigation.

6.2.1 Analytical Methods and Quantitation Limits

The employed analytical methods and their corresponding quantitation limits were evaluated for suitability for the risk assessment. The analytical methods incorporate quality control measures to ensure confidence in target compound identification and quantitation. Before eliminating undetected chemicals, sample quantitation limits (SQLs) were reviewed against corresponding standards and criteria (ARARs). Quantitation limits were assessed for proper adjustment due to dilutions or when use of a smaller sample aliquot was required due to limited sample volume.

6.2.2 Comparison with Concentrations in Blanks

Results of field and laboratory blank analyses were compared with sample analytical results to determine if contamination was introduced during sample collection, shipment, or analysis. In accordance with the USEPA validation guidelines referenced above, chemicals present in both site samples and corresponding field, trip, or method blanks were included in the HRA only if the following criteria were met. Common laboratory contaminants must exceed the detected concentration in the associated field, trip, and method blanks by a factor of 10. The chemicals considered by USEPA to be common laboratory contaminants include methylene chloride, acetone, toluene, 2-butanone, and phthalates. All other analytes found in soil samples must exceed the detected concentration of the corresponding analyte in the associated blanks by a factor of 5. Data tables in Appendix D reflect the results of the data validation, and indicate which chemicals were considered field and/or laboratory contaminants and are, therefore, not included in the HRA.

6.2.3 Evaluation of Qualified Data

Qualified data were evaluated to determine their appropriateness for use in the HRA. Analytical results qualified with a "U" indicate that a chemical was analyzed for, but not detected. Chemicals with U-qualified data were included in the HRA only when there was at least one detection of that chemical in a particular medium. U-qualified data then were used at a value of one-half the sample quantitation limit in the calculation of exposure point concentrations. Organics detected at concentrations below the quantitation limit were flagged by the laboratory with a "J," indicating that the reported concentration is an estimate, although the identity of the analyte

is certain. Data may be qualified as estimated during the data validation process for a number of reasons. J-qualified data are considered acceptable for use in the HRA. Analytical results qualified with an "R" (i.e., rejected) during the data validation process were excluded from the HRA. Data are rejected on the basis of questionable laboratory performance (e.g., deviation from CLP protocols sufficient to introduce uncertainty in the identity of the analyte or gross uncertainty in its concentrations). Appendix D presents the results of the data validation and any qualified data.

6.2.4 Evaluation of Duplicate Analyses

Duplicate analytical results of field duplicate samples were validated as unique data and then were averaged (original and duplicate) for inclusion in the HRA. If a compound was detected in only one sample and not in the duplicate, the detected concentration was utilized in the HRA. Duplicate analytical results from reanalysis due to dilutions or QA/QC problems were reviewed, and a single value was selected for inclusion in the HRA.

6.2.5 Evaluation of Tentatively Identified Compounds (TICs)

As recommended in *RAGS* (USEPA 1989a), TICs were reviewed for input to the HRA. Until a standard is analyzed, however, positive identification of a TIC remains uncertain. Analytical standards are not analyzed for TICs, which leads to uncertainties in chemical identification and quantitation of a TIC. Only one unidentified TIC, a terpene isomer, was reported for soil volatile results. Of the TICs reported for the semivolatile fraction, only benzoic acid was identified; however, it was not confirmed. Because benzoic acid was the only TIC identified and due to uncertainties regarding the identification and concentration, TICs were not included in the HRA.

6.3 Hazard Identification

6.3.1 Identification of Media of Concern

Surface and subsurface soil data collected at eight boring locations during the SI are included in the HRA as media of concern (Figure 2-1). Surface soil samples were collected at all eight locations at depths ranging between 0 and 3.5 feet bgs (see Appendix B). Two additional subsurface soil samples were collected at locations MW-34-001 (4 to 6 feet deep) and WB-MW-34-003 (5 to 7 feet deep). Receptors may be exposed to surface soil via direct exposure. Since the site may be developed in the future, intrusive activities during construction are possible. Under this future use scenario, direct exposure to both surface and subsurface soil could occur during construction or after regrading of the site.

Groundwater was not considered a medium of concern for this HRA. Groundwater data could not be obtained during the SI because the shallow overburden aquifer, consisting of a silty clay layer overlain by a thin (i.e., 1 to 3 feet) sand unit, proved to be unproductive. A well installed at location MW-34-001 did not yield sufficient water to be developed or sampled and subsequently was abandoned. Also, shallow groundwater is not used as a potable source at or downgradient from the site and is unlikely to be used as a potable supply source in the future. The bedrock aquifer was not investigated because the clay layer acts as a significant confining unit that would likely preclude the migration of any site contaminants to bedrock.

Surface water and sediment were not encountered in the formerly utilized areas of the site and, therefore, were not considered media of concern for this HRA. Although the southern boundary of the site abuts the Salmon

River, surface water and sediment from the Salmon River were not collected as part of the SI. If data were to be collected, potential contamination attributable to SS-034 could not be determined since other upgradient sources may be impacting the Salmon River.

6.3.2 Identification of Chemicals of Potential Concern

Data presented in the SI report were analyzed statistically to select chemicals of potential concern (CPCs) for inclusion in the baseline HRA. In general, all detected organic compounds were considered CPCs. However, several inorganic chemicals in soil were eliminated from consideration as a result of a statistical screening procedure which indicated that these inorganic chemicals were present at background levels.

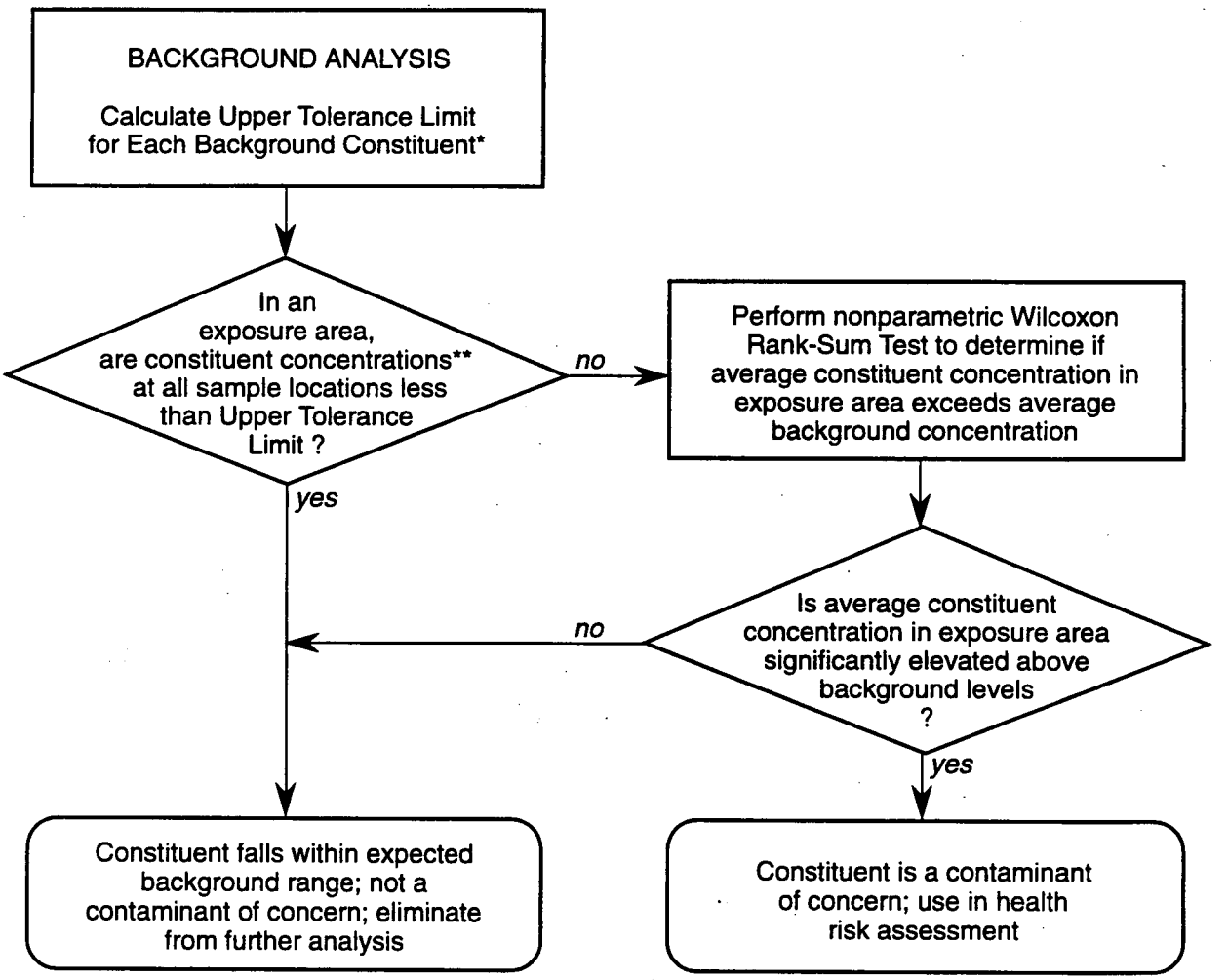
The statistical methods utilized for CPC screening are established and well-documented in many statistical texts. Two USEPA documents were utilized as the primary references in the development of the CPC screening procedure (USEPA 1989b; 1992a). The statistical screening procedure is described below.

Figure 6-1 presents the two-step methodology utilized for CPC screening of soil. In the first screening step, the concentration of each individual soil sample constituent is compared to the corresponding upper tolerance limit for that constituent derived from basewide background soil data. Based on the USEPA guidance (USEPA 1989b), a one-sided upper tolerance limit with a coverage of 95 percent and a confidence coefficient of 95 percent was used for the first screening step. The upper tolerance limit, hereinafter referred to as the "95% UTL", is the statistically derived background concentration. If none of the onsite detections of a sample constituent exceeds the 95% UTL, it can be safely concluded that the constituent is present at background levels and the constituent is not considered a CPC. Background data and derivation of 95% UTLs are presented in the basewide *Background Surface Soil and Groundwater Survey* (URS 1995c).

The nature of tolerance intervals is such that, even in the absence of contamination, a certain percentage of measurements can be expected to exceed the upper tolerance limits by random chance. For example, approximately 5 percent (or 1 in every 20) of onsite constituent concentrations would be expected to exceed the 95% UTL if onsite constituent concentrations are at background levels. Because these occasional exceedances do not necessarily indicate the presence of contamination at a site, a second screening step is used for inorganic constituents which exceed the 95% UTL in one or more onsite samples (Figure 6-1). In the second screening step, the onsite mean concentration is compared to the mean of the background samples using the non-parametric Wilcoxon Rank-Sum Test procedure. If the onsite mean concentration does not exceed the mean of the background samples, then the constituent is within the expected background range and is not considered a CPC. If the onsite mean concentration does exceed the mean background concentration, the constituent is considered a CPC and is included in the HRA.

Constituents detected in onsite samples, but not in background samples, could not be statistically analyzed and are considered CPCs by default. Calcium, magnesium, sodium, and potassium were not used in the HRA since, in accordance with *RAGS* (USEPA 1989a), "Chemicals that are (1) essential human nutrients, (2) present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and (3) toxic only at very high doses (i.e., much higher than those that could be associated with contact at the site) need not be considered further in the quantitative risk assessment".

The identification of CPCs in surface soil and surface and subsurface soil combined are summarized in Tables 6-1 and 6-2, respectively. Detailed calculations for the second screening step are presented in Appendix G (Tables G-1 and G-2).



* Upper Tolerance Limits presented in base-wide background report (URS, 1995)

** original or log-transformed, depending upon background distribution

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METHOD FOR DETERMINING INORGANIC CPCs IN SOIL

FIGURE 6-1

TABLE 6-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL
CURRENT USE SCENARIO

CHEMICAL	MAXIMUM CONCENTRATION (mg/kg)	FREQUENCY OF DETECTION	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND SOIL		WILCOXON RANK-SUM TEST ONSITE VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS	CHEMICAL OF POTENTIAL CONCERN
			95% UPPER TOLERANCE LIMIT* (mg/kg)	PERFORM WILCOXON RANK SUM TEST?	BACKGROUND MEAN EXCEEDED?	
Acetone	1.50E-02	7 / 8	—	—	—	YES
1,1,1-Trichloroethane	3.40E-02	1 / 8	—	—	—	YES
Diethylphthalate	1.05E-01	1 / 8	—	—	—	YES
Di-n-butylphthalate	1.20E-01	1 / 8	—	—	—	YES
Aluminum	9.51E+03	8 / 8	8.51E+03	YES	NO	NO
Arsenic	3.30E+00	3 / 8	3.44E+00	NO	—	NO
Barium	7.93E+01	8 / 8	1.01E+02	NO	—	NO
Beryllium	3.80E-01	7 / 8	7.40E-01	NO	—	NO
Cadmium	1.80E+00	1 / 8	1.30E+00	YES	NO	NO
Calcium**	5.89E+03	8 / 8	3.02E+04	NO	—	NO
Chromium	1.91E+01	8 / 8	1.95E+01	NO	—	NO
Cobalt	1.01E+01	8 / 8	9.20E+00	YES	NO	NO
Copper	1.42E+01	6 / 8	4.41E+01	NO	—	NO
Iron	1.57E+04	8 / 8	3.67E+04	NO	—	NO
Lead	6.20E+00	8 / 8	7.94E+01	NO	—	NO
Magnesium**	4.45E+03	8 / 8	3.34E+03	NO	—	NO
Manganese	3.10E+02	8 / 8	4.74E+02	NO	—	NO
Nickel	1.72E+01	8 / 8	1.26E+01	YES	NO	NO
Potassium**	1.80E+03	8 / 8	9.29E+02	NO	—	NO
Selenium	1.30E+00	2 / 8	1.65E+00	NO	—	NO
Sodium**	3.69E+02	8 / 8	5.20E+02	NO	—	NO
Vanadium	2.29E+01	8 / 8	—	—	—	YES
Zinc	6.43E+01	7 / 7	6.34E+01	YES	NO	NO

NOTES:

* - Upper Tolerance Limits presented in basewide background report (URS 1995c)

** - Not considered a chemical of potential concern since it is an essential nutrient.

TABLE 6-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CHEMICALS OF POTENTIAL CONCERN IN SOIL
FUTURE USE SCENARIO

CHEMICAL	MAXIMUM CONCENTRATION (mg/kg)	FREQUENCY OF DETECTION	COMPARE MAXIMUM ONSITE CONCENTRATION TO UPPER TOLERANCE LIMIT OF BACKGROUND SOIL		WILCOXON RANK-SUM TEST ONSITE VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS	CHEMICAL OF POTENTIAL CONCERN
			95% UPPER TOLERANCE LIMIT* (mg/kg)	PERFORM WILCOXON RANK SUM TEST?	BACKGROUND MEAN EXCEEDED?	
Acetone	1.50E-02	8 / 10	—	—	—	YES
1,1,1-Trichloroethane	3.40E-02	2 / 10	—	—	—	YES
Diethylphthalate	1.10E+00	2 / 10	—	—	—	YES
Di-n-butylphthalate	1.20E-01	2 / 10	—	—	—	YES
Aluminum	2.63E+04	10 / 10	8.51E+03	YES	YES	YES
Arsenic	3.30E+00	10 / 10	3.44E+00	NO	—	NO
Barium	2.82E+02	10 / 10	1.01E+02	YES	NO	NO
Beryllium	1.20E+00	9 / 10	7.40E-01	YES	NO	NO
Cadmium	1.80E+00	3 / 10	1.30E+00	YES	YES	YES
Calcium**	7.45E+03	10 / 10	3.02E+04	NO	—	NO
Chromium	5.57E+01	10 / 10	1.95E+01	YES	NO	NO
Cobalt	2.74E+01	10 / 10	9.20E+00	YES	NO	NO
Copper	4.18E+01	8 / 10	4.41E+01	NO	—	NO
Iron	4.08E+04	10 / 10	3.67E+04	YES	NO	NO
Lead	7.00E+00	10 / 10	7.94E+01	NO	—	NO
Magnesium**	1.44E+04	10 / 10	3.34E+03	NO	—	NO
Manganese	6.80E+02	10 / 10	4.74E+02	YES	NO	NO
Nickel	5.09E+01	10 / 10	1.26E+01	YES	NO	NO
Potassium**	6.83E+03	10 / 10	9.29E+02	NO	—	NO
Selenium	1.70E+00	3 / 10	1.65E+00	YES	NO	NO
Sodium**	9.40E+02	10 / 10	5.20E+02	NO	—	NO
Vanadium	6.93E+01	10 / 10	—	—	—	YES
Zinc	1.10E+02	8 / 8	6.34E+01	YES	NO	YES

NOTES:

* - Upper Tolerance Limits presented in basewide background report (URS 1995c)

** - Not considered a chemical of potential concern since it is an essential nutrient.

6.4 Exposure Assessment

The purpose of this exposure assessment is to estimate the type and magnitude of potential human exposure to CPCs identified at SS-034. Ultimately, this estimate is achieved by determining an exposure dose for each pathway and each CPC. There are four steps in the exposure assessment: (1) identification of potentially exposed populations; (2) identification of potential routes of exposure; (3) estimation of chemical concentrations at the potential point of exposure; and (4) estimation of an exposure dose (i.e., chemical intake) for each pathway.

6.4.1 Identification of Potentially Exposed Populations

Plattsburgh AFB was closed in September 1995. Two potential land use scenarios have been identified for SS-034 based on current knowledge. First, the site will be left undeveloped (in its current state) and the public may access it for recreational use. Second, the site will be developed for specific community use (e.g., residential). In this HRA, the first scenario is considered the current land use scenario, whereas the second scenario is considered the potential future land use scenario.

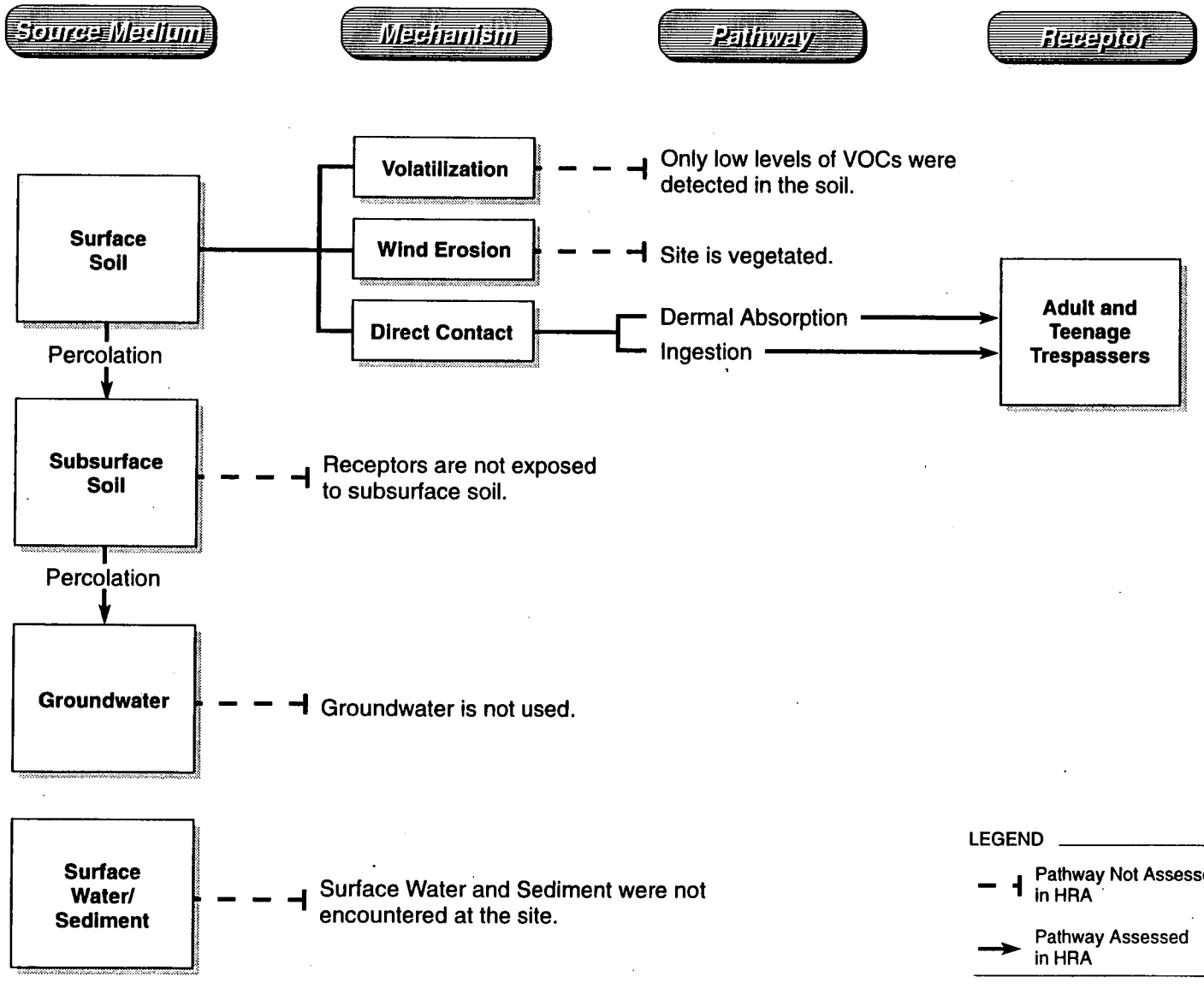
Potentially exposed populations were identified for both current and potential future land use conditions at SS-034. Under the current land use scenario, it is assumed that adult and teenage trespassers may access the abandoned site for recreational purposes (hunters are known to trespass on site). Although children also may trespass on site, given the current site conditions and local population demographics (URS conducted a community well survey in this area in January 1996), teenage trespassers would be likely to access the site at a greater frequency than children. Therefore, teenage trespassers were evaluated as being the most reasonable maximum (subchronic) exposed population. Future populations potentially exposed to site contaminants will depend on base redevelopment. It has been conservatively assumed that the site will be developed for residential use since it presently is bordered by residential areas (Figure 3-1). Future exposure to site contaminants is considered in two phases. In the first phase, construction workers would be exposed to contaminated soil during intrusive activities. In the second phase, adult and child residents would be exposed to contaminated soil after residential development.

6.4.2 Identification of Potential Routes of Exposure

Exposure pathways for SS-034 have been developed for current and potential future land use scenarios. A pathway is considered complete if there is (1) a source or chemical release from a source; (2) an exposure point where contact can occur; and (3) an exposure route (e.g., ingestion) by which contact can occur. If the exposure point differs from the source, a transport/exposure medium also is necessary. Figures 6-2 and 6-3 present the potential exposure pathways under current and future land use scenarios, respectively.

6.4.2.1 Current Land Use

For the current land use scenario, incidental ingestion of and dermal contact with site-related CPCs in surface soil are potential exposure pathways for adult and teenage trespassers. Inhalation of fugitive dust from wind erosion, however, is not an exposure pathway of concern since the site is almost completely vegetated as shown in Photos 1 through 4. Exposure of trespassers to surface water, sediment, and groundwater were not assessed because surface water and sediment were not encountered on the site and groundwater currently is not used at SS-034.



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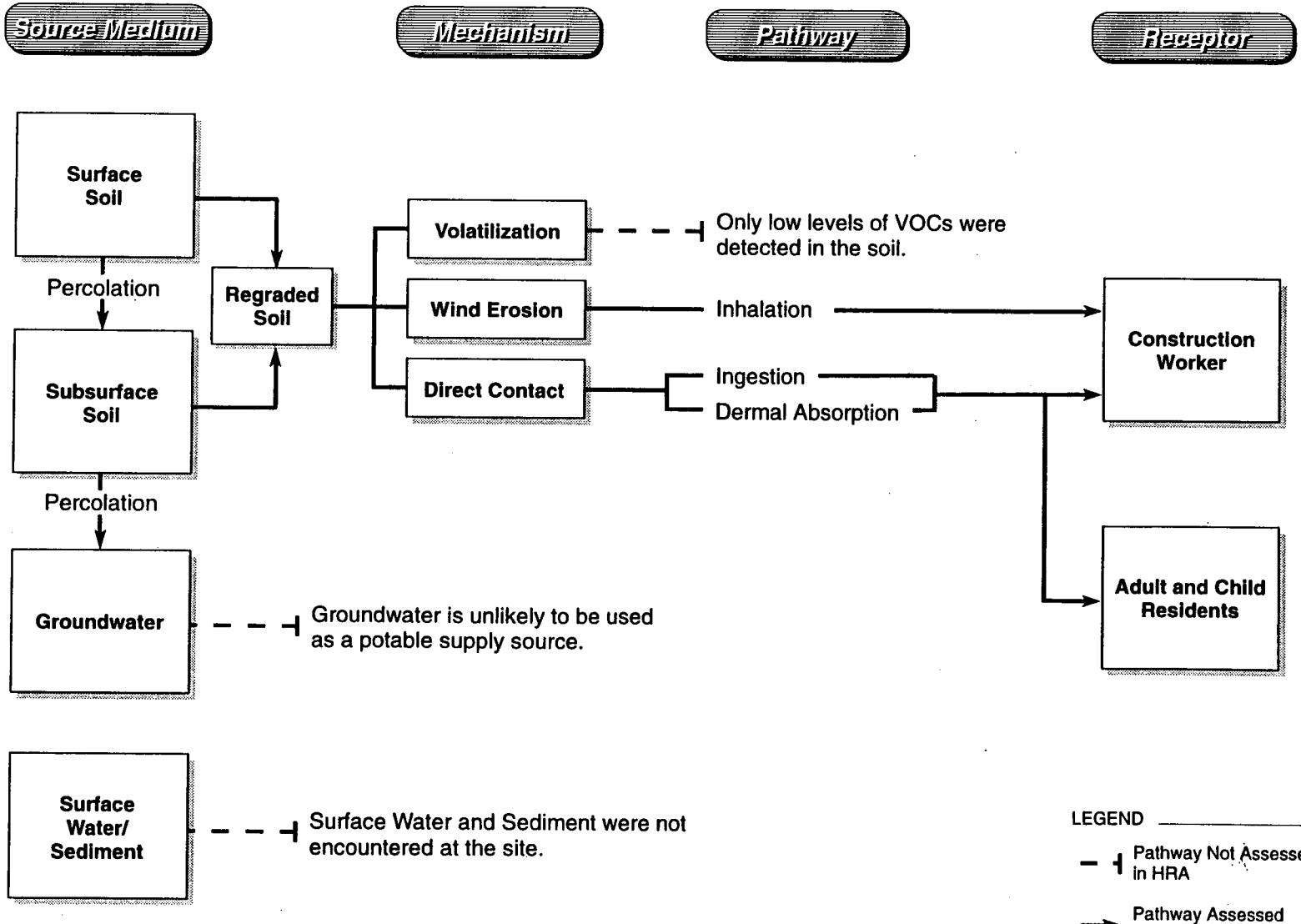
PLATTSBURGH AFB - SS-034 HRA
EXPOSURE PATHWAYS - CURRENT USE

FIGURE 6-2



URS CONSULTANTS, INC.

PLATTSBURGH AFB - SS-034 HRA
EXPOSURE PATHWAYS - FUTURE USE

FIGURE 6-3

Exposure to organic chemicals volatilizing from surface and subsurface soil was assessed for inclusion in the HRA. 1,1,1 - Trichloroethane, diethylphthalate, and di-n-butylphthalate were detected infrequently in the surface soil, with concentrations ranging from 34 micrograms per kilogram (µg/kg) to 120 µg/kg. Acetone was detected more frequently but at lower concentrations (3 µg/kg to 15 µg/kg). Based on the data, this pathway does not appear to represent a significant risk and was not evaluated in the HRA.

6.4.2.2 Future Land Use

The potential exposure pathways for the receptors in the future land use scenario include incidental ingestion of and dermal contact with surface and subsurface soil. In addition, construction workers would be exposed to fugitive dust via inhalation during intrusive activities. After construction completion, the site most likely will be covered with vegetation (i.e., grass lawns, shrubs, trees) and pavement (i.e., roads and driveways). Therefore, inhalation of fugitive dust is an incomplete exposure pathway for future residents.

Other potential exposure pathways were not assessed for various reasons. Risk associated with the volatilization of CPCs was not considered significant due to the low concentrations of volatiles in the soil. Exposure to surface water and sediment were not assessed since neither were encountered in potentially developable portions of the site. Exposure to groundwater was not assessed because the hydraulic conductivity of overburden soils is insufficient to provide adequate well yield for residential consumption. In addition, no groundwater data were collected due to low productivity of the monitoring well installed during field activities.

6.4.3 Development of Exposure Concentrations

In order to quantify health effects, it is necessary to establish the concentration of each CPC at the point where it comes into contact with a human receptor; that is, along a completed exposure pathway. For pathways of direct exposure to contaminants in the media of concern (e.g., ingestion, dermal contact), exposure concentrations are developed directly from chemical data. For pathways of indirect exposure to contaminants (e.g., the inhalation of fugitive dust), modeling is required to develop exposure concentrations.

Because of the uncertainty associated with the estimation of exposure concentrations, statistical methods were employed to calculate them. The exposure concentrations used to assess health risks are based on the 95% upper confidence limit (UL_{95}) on the arithmetic mean for each CPC in each medium of concern. Two formulas are prescribed for calculation of the UL_{95} in the USEPA guidance (USEPA 1992c). The appropriate formula depends on the distribution of the data (i.e., normal or log-normal distribution). In this HRA, a skewness coefficient was utilized to evaluate the data distribution and was calculated using the following formula:

$$Skewness = \frac{n}{(n-1)(n-2)} \sum \left[\frac{x_1 - \bar{x}}{s} \right]^3$$

Where:

n	=	Number of measurements
x_1	=	Detected concentration or half the detection limit
$\bar{x}$	=	Arithmetic mean
s	=	Standard deviation

If the absolute value of the skewness coefficient was less than one, then the data was assumed to be distributed normally. If the absolute value of the skewness coefficient was greater than or equal to one, then the data was assumed to be log-normal.

For small sample sizes, the large variability in the measured concentration often yields a UL_{95} value greater than the maximum detected concentration. In these cases, the maximum detected concentration was used to represent the exposure concentration. For those samples where the CPC was not detected, the exposure concentration was calculated assuming one-half the SQL for organics or one-half the contract-required detection limit for inorganics.

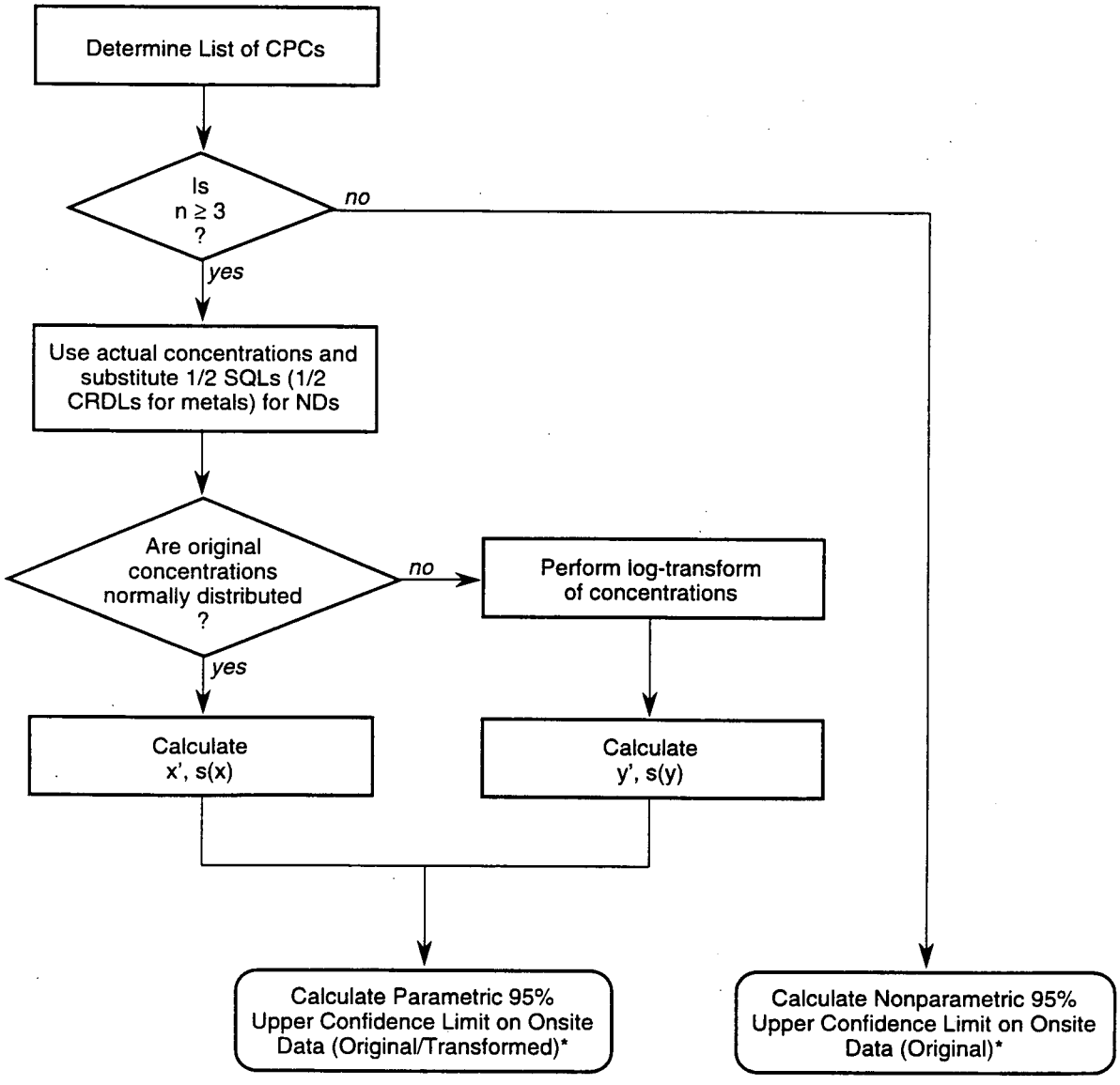
The method utilized to establish the UL_{95} from onsite data is summarized in Figure 6-4. Exposure point concentrations for surface soil and the combination of surface and subsurface soil determined by this methodology are summarized in Tables 6-3 and 6-4, respectively. Detailed calculations are presented in Appendix G (Table G-3 and G-4).

Exposure concentrations for the inhalation of fugitive dust are based on soil concentrations presented in Table 6-4, and a factor determined from fugitive dust models created by the NYSDEC and USEPA (NYSDEC 1991; USEPA 1985) presented in Table 6-5. A more detailed description of the fugitive dust model and the determination of respirable concentrations for surface/subsurface soil is presented in Appendix H.

6.4.4 Estimation of Intake/Absorbed Dose and Exposure Parameters

The exposure dose, which is expressed either as an intake (i.e., administered dose) for ingestion and inhalation routes or as an absorbed dose for the dermal contact route, is defined as the mass of a substance in contact with an organism's exchange boundary (e.g., lungs, skin) per unit body weight per unit time. Units for intake or absorbed dose are typically milligrams per kilogram-day (mg/kg-day). The intake (administered dose) and absorbed dose are calculated using the identified CPC exposure concentration in the environmental medium of concern, and a number of intake variables (or exposure parameters) expressing the frequency, duration, and magnitude of exposure.

In addition, for calculating an absorbed dose via dermal contact, CPC-specific dermal absorption factors are also included as an exposure parameter. Dermal absorption factors are used to reflect the desorption of a CPC from the soil and the corresponding absorption of the CPC through the skin and into the blood stream. Cadmium is the only CPC identified in soil (surface and subsurface soil combined) that has a published absorption factor of 0.01 (USEPA 1992b). In the absence of absorption factors for other CPCs, the dermal contact with surface soil under the current scenario could not be evaluated in this HRA. Under the future scenario, dermal contact with soil was evaluated for cadmium only. The uncertainty associated with this data gap is presented in Table 6-11. The exposure parameters, discussed below, are selected conservatively so that in combination, they produce an estimate of the reasonable maximum exposure for each particular exposure pathway.



* If the calculated 95% Upper Confidence Limit exceeds the maximum concentration detected in the background samples, then the maximum detection will become the 95% Upper Confidence Limit.

NOTES:

n = number of samples analyzed
x' = sample mean of original (untransformed) data
s(x) = sample standard deviation of original (untransformed) data
y' = sample mean of log-transformed data
s(y) = sample standard deviation of log-transformed data
SDL = sample detection limit
CRDL = contract required detection limit
ND = Non-detection

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METHOD FOR ESTABLISHING 95% UPPER CONFIDENCE LIMITS FOR ONSITE CONSTITUENTS

FIGURE 6-4

TABLE 6-3

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
SUMMARY OF EXPOSURE CONCENTRATIONS FOR SURFACE SOIL
CURRENT USE SCENARIO

Parameter	Distribution	UL-95 Value (mg/kg)	Maximum Conc. (mg/kg)	**Exposure Concentration** (mg/kg)
Acetone	NORMAL	1.11E-02	1.50E-02	1.11E-02
1,1,1-Trichloroethane	LOGNORMAL	1.65E-02	3.40E-02	1.65E-02
Diethylphthalate	LOGNORMAL	2.22E-01	1.05E-01	1.05E-01
Di-n-butylphthalate	LOGNORMAL	2.17E-01	1.20E-01	1.20E-01
Vanadium	NORMAL	1.70E+01	2.29E+01	1.70E+01

TABLE 6-4

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
SUMMARY OF EXPOSURE CONCENTRATIONS FOR SOIL*
FUTURE USE SCENARIO

Parameter	Distribution Distribution	UL-95 Value (mg/kg)	Maximum Conc. (mg/kg)	**Exposure Concentration** (mg/kg)
Acetone	NORMAL	1.12E-02	1.50E-02	1.12E-02
1,1,1-Trichloroethane	LOGNORMAL	1.84E-02	3.40E-02	1.84E-02
Diethylphthalate	LOGNORMAL	4.22E-01	1.10E+00	4.22E-01
Di-n-butylphthalate	LOGNORMAL	1.20E-01	1.20E-01	1.20E-01
Aluminum	LOGNORMAL	1.66E+04	2.63E+04	1.66E+04
Cadmium	LOGNORMAL	1.37E+00	1.80E+00	1.37E+00
Vanadium	LOGNORMAL	4.55E+01	6.93E+01	4.55E+01
Zinc	LOGNORMAL	8.06E+01	1.10E+02	8.06E+01

* - Soil consists of surface and subsurface soil.

TABLE 6-5

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
MODELED RESPIRABLE FUGITIVE DUST CONCENTRATIONS FOR SOIL*
FUTURE USE SCENARIO

CHEMICAL	EXPOSURE CONCENTRATION (CS) (mg/kg)	MODELING EXPOSURE FACTOR (MEF) (mg/m^3)	RESPIRABLE CONCENTRATION (CA) (mg/m^3)
Acetone	1.12E-02	5.39E-01	6.04E-09
1,1,1-Trichloroethane	1.84E-02	5.39E-01	9.89E-09
Diethylphthalate	4.22E-01	5.39E-01	2.27E-07
Di-n-butylphthalate	1.20E-01	5.39E-01	6.46E-08
Aluminum	1.66E+04	5.39E-01	8.92E-03
Cadmium	1.37E+00	5.39E-01	7.36E-07
Vanadium	4.55E+01	5.39E-01	2.45E-05
Zinc	8.06E+01	5.39E-01	4.34E-05

EQUATION:

$CA = CS \times 0.000001 \times MEF$

NOTE:

* - Soil consists of surface and subsurface soil.

The intake equations for each exposure pathway, derived from *RAGS* (USEPA 1989a), are presented in Tables 6-6 and 6-7. The exposure parameters used in these equations were taken from *RAGS* (USEPA 1989a), the USEPA supplemental guidance memorandum entitled *Standard Default Exposure Factors* (USEPA 1991), the *Exposure Factors Handbook* (USEPA 1990b), and the *Dermal Exposure Assessment: Principles and Applications* (USEPA 1992b). The exposure parameters used in the HRA also are presented in Tables 6-6 and 6-7. Exposure parameters that differ from the default values presented in these documents are discussed below.

Frequency and Duration of Exposure to Soil

A total exposure duration (construction period) of three months was used to evaluate risks associated with exposure to soil contamination for the construction worker. The exposure frequency was assumed to be five days per week during this three-month (13 week) period.

An exposure frequency of 180 days per year (five days per week for 26 weeks/year) was used to evaluate risks associated with exposure to soil contamination for future adult or child residents. This exposure frequency is used because it is expected that these receptors would be exposed only six months per year (May to October). Cold weather and snow (ground cover) would prevent exposure during winter months.

In the absence of a USEPA-recommended exposure frequency for trespassers, an exposure frequency of three days per week for 26 weeks (78 days) was used for the current land use scenario. This value was based on professional judgement assuming that trespassers would spend time at the site mostly on the weekends (two days) and once (one day) during the week.

Ingestion of Soil

The highest value, 1.0, was used for the fraction ingested to evaluate the soil ingestion pathway. This is a conservative assumption, but is general practice in HRAs. In the absence of a USEPA-recommended ingestion rate for adult and teenage trespassers, an ingestion rate of 100 mg/day was used for the current scenario. This rate is equal to the default adult ingestion rate for a residential scenario provided in *RAGS* (USEPA 1989a).

Inhalation of Fugitive Dust

The value used for the inhalation rate was developed from inhalation rate data reported in *Exposure Factors Handbook* (USEPA 1990b). For a reasonable construction scenario, it was assumed that an individual would spend 50 percent of time working at a heavy activity level and 50 percent of the time working at a moderate activity level. The value calculated for the construction worker is 3.0 cubic meters per hour (m^3/hr).

Skin Surface Area

The skin surface area used for construction workers is the sum of the surface area of the hands and arms (USEPA 1989a). The value reported for a male adult is 3,120 cm^2. The value used for adult residents is 7,948 cm^2 (USEPA 1990b), based on an average of male and female surface areas for arms, hands, and legs. The value used for the child resident is 3,520 cm^2 (USEPA 1990b). This value was calculated using body surface area data for hands, arms, legs, and feet, from males and females aged 1 to 6 years old. The 50th percentile skin surface area values were used.

TABLE 6-6

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
SUMMARY OF EXPOSURE PARAMETERS
CURRENT USE SCENARIO

PARAMETER	TRESPASSER					
	ADULT			TEENAGER		
	SURFACE SOIL			SURFACE SOIL		
	INGESTION			INGESTION		
CS		mg/kg			mg/kg	
IR	100	mg/day	(4)	100	mg/day	(4)
CF	1E-06	kg/mg	(1)	1E-06	kg/mg	(1)
FI	1.0	(unitless)	(4)	1.0	(unitless)	(4)
EF	78	days/year	(4)	78	days/year	(4)
ED	30	years	(2)	6	years	(2)
BW	70	kg	(1)	56	kg	(3)
AT (carcinogens)	25,550	days	(1)	25,550	days	(1)
AT (noncarcinogens)	10,950	days	(1)	2,190	days	(1)

ABBREVIATIONS:
CS - Chemical concentration in surface soil
IR - Ingestion rate or inhalation rate
CF - Conversion factor
FI - Fraction ingested
EF - Exposure frequency
ED - Exposure duration
BW - Body weight
AT - Averaging time

EQUATION:

Soil Ingestion: $Intake = (CS \times IR \times CF \times FI \times EF \times ED) / (BW \times AT)$

SOURCES:
(1) USEPA, 1989a. Risk Assessment Guidance for Superfund.
(2) USEPA, 1991. Standard Default Exposure Factors (Supplemental Guidance Memorandum).
(3) USEPA, 1990b. Exposure Factors Handbook.
(4) Professional judgement - See text.

TABLE 6-7

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
SUMMARY OF EXPOSURE PARAMETERS
FUTURE USE SCENARIO

PARAMETER	RESIDENT				CONSTRUCTION WORKER		
	ADULT		CHILD				
	SOIL*				SOIL*		
	INGESTION	DERMAL CONTACT	INGESTION	DERMAL CONTACT	DERMAL CONTACT	INGESTION	INHALATION FROM FUGITIVE DUST
CS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	—
CA	—	—	—	—	—	—	mg/m³
IR	100 mg/day (2)	—	200 mg/day (2)	—	—	480 mg/day (2)	3 m³/hr (3)
CF	1E-06 kg/mg (1)	1E-06 kg/mg (1)	1E-06 kg/mg (1)	1E-06 kg/mg (1)	1E-06 kg/mg (1)	1E-06 kg/mg (1)	—
FI	1.0 (unitless) (5)	—	1.0 (unitless) (5)	—	—	1.0 (unitless) (5)	—
EF	180 days/year (5)	180 events/year (5)	180 days/year (5)	180 events/year (5)	5 days/week (5)	5 days/week (5)	5 days/week (5)
ED	30 years (2)	30 years (2)	6 years (5)	6 years (5)	13 weeks (5)	13 weeks (5)	13 weeks (5)
ET	—	—	—	—	—	—	8 hrs/day (5)
SA	—	7,948 cm²/event (5)	—	3,520 cm²/event (5)	3,120 cm²/event (5)	—	—
AF	—	1.0 mg/cm² (4)	—	1.0 mg/cm² (4)	1.0 mg/cm² (4)	—	—
ABS	—	(a) (4)	—	(a) (4)	(a) (4)	—	—
BW	70 kg (2)	70 kg (2)	15 kg (2)	15 kg (2)	70 kg (2)	70 kg (2)	70 kg (2)
AT (car.)	25,550 days (1)	25,550 days (1)	25,550 days (1)	25,550 days (1)	25,550 days (1)	25,550 days (1)	25,550 days (1)
AT (noncar.)	10,950 days (1)	10,950 days (1)	2,190 days (1)	2,190 days (1)	91 days (1)	91 days (1)	91 days (1)

ABBREVIATIONS:

CS - Chemical concentration in soil*
CA - Chemical concentration in air
IR - Ingestion rate or inhalation rate
CF - Conversion factor
FI - Fraction ingested
EF - Exposure frequency
ED - Exposure duration
ET - Exposure Time
SA - Skin surface area available for contact
AF - Soil to skin adherence factor
ABS - Absorption factors
BW - Body weight
AT - Averaging time

SOURCES:

(1) USEPA, 1989a. Risk Assessment Guidance for Superfund.
(2) USEPA, 1991. Standard Default Exposure Factors (Supplemental Guidance Memorandum).
(3) USEPA, 1990b. Exposure Factors Handbook.
(4) USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications.
(5) Professional judgement - See text.

NOTES:

(a) - Absorption factors (unitless) are available for cadmium (0.01) and PCBs (0.06) only (USEPA, 1992b)

* - Soil consists of surface and subsurface soil

EQUATIONS:

Inhalation: Intake = (CA × IR × ET × EF × ED) / (BW × AT)

Soil Ingestion: Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Dermal Contact with Soil: Absorbed Dose = (CS × CF × SA × AF × ABS × EF × ED) / (BW × AT)

6.5 Toxicity Assessment

The CPCs identified from media collected at SS-034 may be categorized by their relative health risks. Risks are evaluated for carcinogenic (chronic only) and noncarcinogenic (chronic effects and subchronic) effects. The USEPA has published toxicity values for both types of effects that are utilized in evaluating these risks.

Toxicity data used in this HRA were collected following the protocol recommended by the USEPA. First, *Integrated Risk Information System (IRIS)* (USEPA 1997) was consulted through an on-line computer linkage. Second, when the information sought was not available on *IRIS*, the *Health Effects Assessment Summary Tables (HEAST)* (USEPA 1995) were consulted. Lastly, USEPA Environmental Criteria & Assessment Office (ECAO) was contacted for toxicity data not available from *IRIS* and *HEAST*. At the time of this report submittal, no additional toxicity data was available from ECAO.

For the evaluation of potential cancer risk from exposure to CPCs, the USEPA has established slope factors (SFs). An SF is a measure of toxicity that quantitatively defines the correlation between dose and response. It is used in the risk assessment to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a known or potential carcinogen. SFs have been published for oral intake and for inhalation routes of exposure.

For evaluating noncarcinogenic effects from exposure to CPCs, oral reference doses (RfDs) are used when the exposure route is via ingestion, while reference concentrations (RfCs) are used when the pathway is via inhalation. Values have been developed for chronic (long-term) and subchronic (short-term) effects.

Chronic RfDs are derived from the No-Observed-Adverse-Effect Level (NOAEL) for the critical toxic effect. They are modified by application of uncertainty factors reflecting the type of study on which the values are based. Chronic RfCs are derived in a similar fashion but are based upon studies of inhalation exposure. For this reason, calculation of RfCs is more complex and, therefore, RfCs are available for fewer chemicals.

Subchronic values for RfDs and RfCs are derived in the same fashion as the chronic values when suitable less-than-lifetime studies are available. Subchronic RfDs and RfCs are used to evaluate noncarcinogenic effects over an exposure period of two weeks to seven years.

Toxicity values used for calculating dermal exposure need to be adjusted since the toxicity values provided by *IRIS* or *HEAST* are based on an administered dose rather than an absorbed dose. For the CPCs identified at this site, a dermal absorption factor (which is necessary for calculation of the absorbed dose in the exposure assessment) is available only for cadmium. The oral RfD (no oral slope factor is available) for cadmium was adjusted to account for absorption efficiency of cadmium by the gastrointestinal tract. In accordance with *RAGS* (USEPA 1989a), the following conversion was used:

Oral RfD (mg/kg-day) x Absorption Efficiency (%) = Adjusted RfD (mg/kg-day) for the absorbed dose

Since toxicity information is limited for many chemicals discussed in the HRA, uncertainty factors are published for noncarcinogenic toxicity values to indicate the relative strength of evidence supporting the toxicity value. These uncertainty factors generally range between 10 and 1,000. A high uncertainty factor indicates low strength of evidence for the toxicity value and further indicates that the toxicity value might change if additional data become available. A low uncertainty factor indicates that there is a high degree of confidence in the value and that a change is less likely should more data become available. The impact of uncertainty factors on the HRA are discussed further in Section 6.8.

6.5.1 Carcinogenic Effects

Table 6-8 summarizes toxicity information for cadmium which is classified as a probable carcinogen (B1) via inhalation. Cadmium is the only CPC identified in the surface/subsurface soil (combined) at the SS-034 site that has probable carcinogenic effects. For cadmium, the following information is provided:

a. Slope Factor, representing a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. Slope factors are expressed as inverse units of dose, i.e., $(mg/kg\text{-}day)^{-1}$. The slope factor allows the calculation of incremental lifetime cancer risk associated with exposure to the chemical at a known or estimated dosage. Table 6-8 provides a slope factor for the inhalation route of exposure. Since cadmium lacks an oral slope factor, estimates of cancer risk associated with cadmium could be evaluated only for the inhalation of fugitive dust by construction workers.

b. Weight-of-evidence for carcinogenicity, expressing the degree of confidence in the likelihood that exposure to a given chemical causes cancer in humans. This weight-of-evidence is based upon the following USEPA classification system:

> Group A--Human Carcinogen - Indicates that there is sufficient evidence from epidemiological studies to support a causal association between an agent and cancer in humans.
>
> Group B--Probable Human Carcinogen - Indicates that there is at least limited evidence from epidemiological studies of carcinogenicity to humans (Group B1) or that, in the absence of positive data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).
>
> Group C--Possible Human Carcinogen - Indicates that there is limited evidence of carcinogenicity in animals and inadequate or lack of human data.
>
> Group D--Not Classified - Indicates that there were no data to evaluate or that the evidence for carcinogenicity in humans and in animals is inadequate.
>
> Group E--No Evidence of Carcinogenicity to Humans - Indicates that there is no evidence of carcinogenicity in at least two adequate animal tests in different species or in both epidemiological and animal studies.

c. Tumor site, i.e., physiological location of cancer upon which the slope factor and weight-of-evidence are based.

d. References, including source(s) and date(s), are provided to indicate the basis for the identified slope factor.

6.5.2 Noncarcinogenic Effects

Unlike carcinogenic effects, noncarcinogenic effects are thought to have a threshold daily dosage level below which adverse effects are not expected. This section provides information concerning these threshold levels. Table 6-9 summarizes noncarcinogenic toxicity information for the CPCs that were identified at SS-034. For each CPC, the following information is provided:

TABLE 6-8

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
TOXICITY VALUES: POTENTIAL CARCINOGENIC EFFECTS

Chemical	Slope Factor		Weight-of-Evidence Classification	Tumor Site(s)		Reference - Date	
	Inhalation (mg/kg-day)^-1	Oral (mg/kg-day)^-1		Inhalation	Oral	Inhalation	Oral
Cadmium	6.30E+00	—	B1	Lung, trachea, and bronchii	—	IRIS-6/97	—

IRIS - Integrated Risk Information System. Date indicates access to IRIS.

— - Not Determined.

TABLE 6-9

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
TOXICITY VALUES: POTENTIAL NONCARCINOGENIC EFFECTS

Chemical	Reference Dose (mg/kg-day)				Critical Effect				Reference - Date			
	Subchronic		Chronic		Subchronic		Chronic		Subchronic		Chronic	
	Inhalation RfD	Oral RfD	Inhalation RfD	Oral RfD	Inhalation	Oral	Inhalation	Oral	Inhalation	Oral	Inhalation	Oral
1,1,1-Trichloroethane	—	—	—	—	—	—	—	—	—	—	—	—
Acetone	—	1.00E+00	—	1.00E-01	—	Inc. liver & kidney wt., nephrotoxicity	—	Inc. liver & kidney wt., nephrotoxicity	—	HEAST-FY95	—	IRIS-6/97
Di-n-butylphthalate	—	1.00E+00	—	1.00E-01	—	Inc. mortality	—	Inc. mortality	—	HEAST-FY95	—	IRIS-6/97
Diethylphthalate	—	8.00E+00	—	8.00E-01	—	Dec. growth and dec. organ wts.	—	Dec. growth rate, alter organ wt.	—	HEAST-FY95	—	IRIS-6/97
Aluminum	—	—	—	—	—	—	—	—	—	—	—	—
Cadmium (food)	—	1.00E-03 **	—	1.00E-03	—	—	—	Significant proteinuria	—	—	—	IRIS-6/97
Vanadium	—	7.00E-03	—	7.00E-03	—	None observed	—	None observed	—	HEAST-FY95	—	IRIS-6/97
Zinc	—	3.00E-01	—	3.00E-01	—	Decreased blood enzyme	—	Anemia, decrease in erythrocyte superoxide dismutase	—	HEAST-FY95	—	IRIS-6/97

NOTES:

— - Not Determined

IRIS - Integrated Risk Information System. Date indicates access to IRIS.

HEAST - Health Effects Assessment Summary Tables. Date indicates the fiscal year they were published.

** - in the absence of established subchronic RfD values, chronic RfD values are utilized.

a. Reference Doses (RfD), expressed in mg/kg-day generally identify the threshold dosage level below which adverse health effects are not expected. In the absence of a published toxicity value for the dermal route of exposure, the oral RfD for cadmium has been adjusted to account for an estimated 5 percent absorption efficiency (USEPA 1989a) by the gastrointestinal tract. The adjusted RfD is then used to estimate the hazard quotient associated with dermally absorbed cadmium.

In accordance with *RAGS* (USEPA 1989a), the chronic RfD was used as the subchronic RfD if subchronic values were not available. Table 6-9 identifies when chronic RfDs were used as subchronic RfDs.

b. Critical Effect expressing the most sensitive end point of adverse response (e.g., liver damage) associated with the exposure to CPC.

c. Source(s) and date(s) of dose-response data.

6.5.3 Chemicals for Which No Values Are Available

Toxicity values are not published for all CPCs identified in environmental samples at SS-034. For example, two CPCs having noncarcinogenic effects, 1,1,1,-trichloroethane and aluminum, were not included in the HRA because toxicity values were not available. The remaining CPCs, for which some toxicity information is available, were included in pathway-specific risk calculations only when relevant toxicity information was available for that pathway. For example, six of the eight CPCs have been assigned chronic oral RfD values but none has been assigned chronic inhalation RfDs. Therefore, risk calculations for noncarcinogenic effects could be completed for exposure via ingestion rather than exposure via inhalation.

For each CPC, a toxicological profile has been prepared that summarizes physical, chemical, and toxicological information. These profiles are presented in Appendix I.

6.6 Risk Characterization Methodology

Health risk is a function of both human exposure and chemical toxicity. The risk characterization for SS-034 is the process by which the toxicity assessment (Section 6.5) is integrated with the exposure assessment (Section 6.4) to estimate present and potential future human health impacts attributable to contamination at the site.

6.6.1 Carcinogenic Risk

Carcinogenic risk is expressed as the incremental lifetime cancer risk to an individual or population exposed to contaminants at a site. This incremental lifetime cancer risk corresponds to the UL_{95} of the probability (when based on animal data), or to the maximum likely estimate (when based on human data, of developing cancer over a 70-year lifetime from exposure to hazardous substances present at a hazardous waste site. It is computed by the following equation:

$$Cancer\ Risk = Exposure\ Intake\ (mg/kg\text{-}day) \times Slope\ Factor\ (mg/kg\text{-}day)\text{-}1$$

As indicated by the above equation, incremental lifetime cancer risk is dimensionless. A risk of 1.0×10^{-6} for example, indicates that an individual would incur an additional risk of 0.000001 (or 1 in 1 million) due to his/her exposure to contaminants at a given site. Alternatively, out of a population of one million persons so exposed, this level of risk would indicate that one person, on average, would contract cancer due to such exposure.

6.6.2 Noncarcinogenic Risk

Evaluation of noncarcinogenic risk is based on a threshold response theory. The process involves a comparison of an exposure intake (or dose) to the estimated threshold response level. The term used to make this comparison is the "hazard quotient", which is defined as:

$$Hazard\ Quotient = \frac{Exposure\ Intake\ or\ Absorbed\ Dose\ (mg/kg\text{-}day)}{Reference\ Dose\ (RfD)\ (mg/kg\text{-}day)}$$

CPCs may have different adverse noncarcinogenic responses, or end points. Therefore, the sum of the hazard quotients for all CPCs within a pathway, called the hazard index, should be interpreted with caution.

Noncarcinogenic effects have been evaluated separately for chronic (lifetime) and subchronic (short-term) exposure. Chronic risk evaluation assumes 30 years of exposure to SS-034 site contaminants that might be experienced by adult trespassers and residents whereas subchronic risk evaluation assumes a shorter exposure (less than 7 years) that might be experienced by construction workers, child residents, and teenage trespassers.

6.6.3 Combination of Risks Across Pathways

As shown in Figure 6-2, two exposure pathways were considered under the current land use scenario. Risk calculations are based on the equation given in Table 6-6 and are presented in Appendix G Table G-5. Total risk was determined solely by the ingestion of surface soil, since the dermal contact pathway could not be evaluated due to the lack of dermal absorption factors. Only risk associated with noncarcinogenic effects was estimated, since the CPCs in surface soil are not identified as potential carcinogens. Table 6-10 summarizes risks to trespassers under the current land use scenario.

Three basic exposure pathways were considered under the future land use scenario. Risk calculations under the future land use scenario are presented in Appendix G Tables G-6 through G-8. Three exposure pathways were evaluated for construction workers. Two exposure pathways were evaluated for future residents. Calculations of the combined total risk for future land use are summarized in Table 6-10.

6.7 Results and Discussion

This discussion focuses on the comparison of risks presented in Table 6-10 to acceptable risk levels established by the USEPA through the National Oil and Hazardous Substance Pollution Contingency Plan (USEPA 1990a). The acceptable levels are as follows:

Noncarcinogenic effects: The hazard index should not exceed unity (1.0) for noncarcinogenic effects. If the hazard index is below this value, adverse noncarcinogenic effects are unlikely, even for sensitive populations.

Carcinogenic effects: For carcinogenic effects, acceptable exposure levels are those which represent an incremental lifetime cancer risk to an individual of between 10^{-6} and 10^{-4}, with the lower value in this range (1×10^{-6}) representing a "point of departure" or target risk level.

TABLE 6-10

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
CANCER RISKS AND HAZARD INDICES FOR MULTIPLE PATHWAYS

	CURRENT USE				FUTURE USE					
	TRESPASSER				CONSTRUCTION WORKER		RESIDENT			
	ADULT		TEENAGER				ADULT		CHILD	
EXPOSURE PATHWAY	CANCER RISK	HAZARD INDEX (CHRONIC)	CANCER RISK	HAZARD INDEX (SUBCHRONIC)	CANCER RISK	HAZARD INDEX (SUBCHRONIC)	CANCER RISK	HAZARD INDEX (CHRONIC)	CANCER RISK	HAZARD INDEX (CHRONIC)
Dermal Contact with soil	NC	NV	NC	NV	NV	9E-03	NV	2E-02	NV	3E-02
Ingestion of soil	NC	7E-04	NC	9E-04	NV	4E-02	NV	6E-03	NV	5E-02
Inhalation of fugitive dust	NA	NA	NA	NA	4E-09	NV	NA	NA	NA	NA
TOTAL EXPOSURE CANCER RISK	—		—		**4E-09**		—		—	
TOTAL EXPOSURE HAZARD INDEX		**7E-04**		**9E-04**		**5E-02**		**3E-02**		**8E-02**

ABBREVIATIONS:

NA - Not Applicable

NC - Not Calculated (No carcinogenic CPCs)

NV - No Value (Dermal absorption factors and/or toxicity values not available for CPCs)

6.7.1 Current Land Use Scenario

The hazard indices are 7×10^{-4} and 9×10^{-4} for adult and teenage trespassers respectively, in the current scenario, indicating that noncarcinogenic risk is not a concern under current conditions. The calculated hazard indices are driven primarily by the ingestion of vanadium in surface soil (Table G-5).

No carcinogenic CPCs were detected in the surface soil, so cancer risks for the receptors under the current scenario do not exist.

6.7.2 Future Land Use Scenario

The total subchronic hazard index for a future construction worker is 5×10^{-2}. This hazard index is below the acceptable value of 1 which indicates that exposure to the site does not pose a noncarcinogenic risk to the future construction worker. The major contributor to this index is the ingestion of vanadium in soil (Table G-7). The total cancer risk for the future construction worker is 4×10^{-9}, which is well below the acceptable risk range (Table G-6). Inhalation of fugitive dust was the only pathway quantitatively evaluated since an oral slope factor for cadmium in soil is not available.

The total hazard indices for future adult and child residents are 3×10^{-2} and 8×10^{-2}, respectively, indicating that minimal noncarcinogenic risk exists for these receptors. Ingestion of vanadium in soil is the major contributor to the hazard index for the child resident (Table G-7). Dermal contact with cadmium in soil is the major contributor to the hazard index for the adult resident (Table G-8). Because the only carcinogenic CPC, cadmium, has no published oral slope factor, no cancer risk was calculated for these receptors.

6.8 Uncertainty Analysis

The estimates of carcinogenic risk and noncarcinogenic health effects (chronic/subchronic) in this HRA are based upon numerous assumptions and, therefore, involve a considerable degree of uncertainty. Some of this uncertainty is inherent in the risk assessment process itself, and in the current limits of scientific knowledge regarding human health risk factors. For example, the necessary extrapolation of animal study data to humans introduces a large uncertainty factor into the process, as does extrapolation from the high doses used in animal studies to the low doses associated with sites such as SS-034. Likewise, estimating human exposure and human intake is largely judgmental, involving the extrapolation of human behavioral patterns (often unknown even at present) into the relatively distant future. The exposure assessment for this study is based upon reasonable maximum exposure defined as the highest exposure that may be reasonably expected at the site. The intent of reasonable maximum exposure is to provide a conservative exposure scenario that is still within the range of possible exposure.

Due to these types of uncertainties, the results of the baseline HRA for SS-034 should not be taken as a characterization of absolute risk, or as a fully probable estimate of this risk. Rather, they are intended to identify the types and relative levels of risk associated with various potential exposure routes at SS-034, so that remedial efforts can focus upon aspects of the site which are of greatest concern from a human health standpoint. Table 6-11 summarizes the uncertainties for this HRA.

6.9 Conclusions

This baseline HRA has been prepared to evaluate potential adverse human health effects resulting from exposure to contaminants from SS-034 in the absence of remedial measures. Risk posed by exposure to site soils given reasonably expected current and future exposure scenarios was quantified in compliance with appropriate USEPA guidance documents.

TABLE 6-11

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
POTENTIAL SOURCES OF UNCERTAINTY

Potential Source	Direction of Effect	Reason for Uncertainty
Likelihood of exposure pathways	Unknown, over- or underestimate risk	Pathways may not actually occur (e.g., the future use construction scenario may never occur), or exposure pathways may not have been included.
Degradation of chemicals	Overestimate risk	Risk estimates are based on recent chemical concentrations. Concentrations may decrease with time as a result of the degradation processes.
Exposure assumptions (frequency, duration, and intensity)	Overestimate risk	Parameters selected are conservative estimates of exposure.
Absorption of soil contaminants through the skin	Unknown	Dermal absorption of chemicals is a function of the length of actual skin contact. Contact at the site may be insufficient to result in the amount of absorption assumed.
Dermal absorption not calculated for most CPCs	Underestimate risk	Dermal absorption factors not available for most CPCs identified.
Extrapolation of animal toxicity data to humans.	Unknown, probably overestimate risk	Animals and humans differ with respect to absorption, metabolism, distribution, and excretion of chemicals. The magnitude and direction of the difference will vary with each chemical. Animal studies typically involve high-dose exposures, whereas humans are exposed to low doses in the environment.
Analytes with no toxicity values	Underestimate risk	There are some analytes for which dose-response data are undetermined or inadequate. The risk associated with these chemicals cannot be quantified.

TABLE 6-11 (Cont'd)

Potential Source	Direction of Effect	Reason for Uncertainty
Use of linearized, multi-stage model to derive cancer slope factors	Overestimate risk	Model assumes a non-threshold, linear at low dose relationship for carcinogens. Many compounds induce cancer by non-genotoxic mechanisms. Model results in a 95% upper confidence limit of the cancer risk. The true risk is unlikely to be higher and may be as low as zero.
Summation of effects (cancer risks and hazard indices) from multiple substances	Unknown	The assumption that effects are additive ignores potential synergistic and/or antagonistic effects. Assumes similarity in mechanism of action, which is not the case for many substances. Compounds may induce tumors or other toxic effects in different organs or systems.
Use of uncertainty factors in the derivation of reference dose	Unknown	Ten-fold uncertainty factors are incorporated to account for various sources of uncertainty (animal to human extrapolation, protection of sensitive human populations, extrapolation from subchronic to chronic data, and use of LOAELs rather than NOAELs). Although some data seem to support the ten-fold factor, its selection is somewhat arbitrary.
Combination of Pathways	Overestimate risk	In order to determine total site-wide risks, the risks were summed over all exposure pathways. However, the net probability of an individual being exposed to all non-exclusive pathways is very low.

The risk evaluation summarized in Table 6-10 demonstrates that under both the current and potential future use scenarios, CPCs detected at SS-034 do not pose adverse noncarcinogenic health threats to potentially exposed populations. The results of the cancer risk evaluation for the future construction scenario demonstrates that inhalation of fugitive dust has an estimated cancer risk is three orders of magnitude (10^{-9}) below the acceptable USEPA cancer risk range.

However, risk has not been quantified completely because some toxicity data was not available. An oral slope factor is not available for cadmium; therefore, cancer risks could not be calculated for soil exposure pathways under the future use scenario (i.e., future cancer risk may be underestimated). A dermal absorption factor is available for only one (i.e., cadmium) of eight CPCs detected in soil; therefore, risk from dermal exposure may be underestimated. No inhalation RfDs or RfCs are available for the CPCs; therefore, noncarcinogenic risk from fugitive dust was not evaluated.

A noncarcinogenic hazard index higher than unity or a cancer risk higher than the range of acceptable risk established by the USEPA generally indicates that remediation is required. A value lower than unity for noncarcinogenic risk or lower than the USEPA range for cancer risk generally indicates that remedial action is not required.

7.0 RECOMMENDATIONS

7.1 Basis

Chemical contamination related to past use of the South Clear Zone as a temporary hot asphalt plant or as a propane distributorship is not evident from the physical observations and chemical analyses completed at SS-034.

The unearthed empty tank that remained on site following purchase of the parcel by the USAF, likely a former septic tank for a propane storage building, was removed from the site and disposed of in July 1997. Discrete soil samples were collected at eight boring locations at the site. No staining or other physical evidence of contamination was observed at these locations or at any location on the site's surface. Four organic compounds were detected in soil (acetone, 1,1,1-trichloroethane, diethyltphthalate, and di-n-butylphthalate), none of which were at concentrations above TBCs. Twelve of 19 metals detected in the soils samples exceeded TBCs, which were developed from the base-wide surface soil database. However, the soils of the South Clear Zone are sandy loams and silty clays, whereas the majority of the base's soils and the soils sampled to develop the background surface soil database are sands or loamy sands. The difference in the elemental composition of these soils can explain most of the apparent elevation of onsite metals concentrations relative to background. The results of the quantitative human health risk evaluation, completed based upon the levels of chemicals measured on site, indicate that no excess carcinogenic or noncarcinogenic human health risk is associated with human exposure to site chemicals at SS-034, given current and reasonably expected future use of the site.

No complete route of exposure to potential receptors exists from the site via a groundwater pathway. SS-034 is underlain by a thick, relatively impermeable silty clay layer that prevents the vertical migration of contaminants. Precipitation on the site either evapotranspirates or horizontally exits the site toward the Salmon River in the thin layer of more permeable material between the silty clay layer and the ground surface. This layer was the focus of the soil sampling undertaken in this study. Since these soils did not contain organic compounds above NYSDEC TBCs (which are based on soil contaminant leachability to groundwater), there is no apparent source for groundwater contamination exiting the site through this layer.

7.2 Recommendation

No action is warranted to reduce or isolate site contaminants at SS-034. A decision document should be prepared to this effect.

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ACRONYM LIST

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BAF	bioaccumulation factor
BGS	below ground surface
C&D	construction & demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm/sec	centimeter per second
cm^3	cubic centimeter
CPC	chemical of potential concern
ECAO	USEPA Environmental Criteria & Assessment Office
ECL	Environmental Conservation Law
ED	exposure duration
EM	electromagnetic
FEMA	Federal Emergency Management Agency
FFA	Federal Facilities Agreement
FS	feasibility study
HARM	Hazard Assessment Ranking Methodology
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
HRA	health risk assessment
HSA	hollow stem auger
ID	internal diameter

ACRONYM LIST (Continued)

IEA	Industrial and Environmental Analysis, Inc.
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
kg	kilogram
LOAEL	lowest-observed-adverse-effects level
m^3/hr	square meter per hour
μg	microgram
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOAEL	no-observed-adverse-effects level
NRHP	National Register of Historic Places
NY	New York
NYCRR	New York Codes Rules and Regulations
NYNHP	New York Natural Heritage Program
NYSDEC	New York State Department of Environmental Conservation
PA	preliminary assessment
PARC	Plattsburgh Airbase Redevelopment Corporation
PDE	potential dietary exposure
PID	photoionization detector
ppb	parts per billion
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RA	risk assessment
RAGS	*Risk Assessment Guidance for Superfund*
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration

ACRONYM LIST (Continued)

RfD	reference dose
RI	remedial investigation
RTV	relative toxicity value
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service (now known as the Natural Resources Conservation Service)
SI	site investigation
SF	slope factor
SOW	Statement of Work
SQL	sample quantitation limit
SVOC	semivolatile organic compound
TAGM	Technical and Administrative Guidance Memorandum, NYSDEC
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TIC	tentatively identified compound
URS	URS Consultants, Inc.
USACE	United States Army Corps of Engineers
USACERL/ TAC	United States Army Construction Engineering Research Laboratories/Technical Assistance Center
USAF	United States Air Force
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
95% UTL	95th percentile upper tolerance limit
UL_{95}	95th percentile upper confidence limit
VOC	volatile organic compound

Appendix A

Analytical Results from Soil Samples

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Parameter	TBC				
Chloromethane	—				
Bromomethane	—				
Vinyl Chloride	200				
Chloroethane	1,900				
Methylene Chloride	100				
Acetone	200		3		12
Carbon Disulfide	2,700				
1,1-Dichloroethene	400				
1,1-Dichloroethane	200				
1,2-Dichloroethene (total)	300				
Chloroform	300				
1,2-Dichloroethane	100				
2-Butanone	300				
1,1,1-Trichloroethane	800				34
Carbon Tetrachloride	600				
Bromodichloromethane	—				
1,2-Dichloropropane	—				
cis-1,3-Dichloropropene	—				
Trichloroethene	700				
Dibromochloromethane	—				
1,1,2-Trichloroethane	—				
Benzene	60				
trans-1,3-Dichloropropene	—				
Bromoform	—				
4-Methyl-2-Pentanone	1,000				
2-Hexanone	—				
Tetrachloroethene	1,400				
1,1,2,2-Tetrachloroethane	600				
Toluene	1,500				
Chlorobenzene	1,700				
Ethylbenzene	5,500				
Styrene	—				
Xylene (total)	1,200				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	4
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Parameter	TBC				
Chloromethane	—				
Bromomethane	—				
Vinyl Chloride	200				
Chloroethane	1,900				
Methylene Chloride	100				
Acetone	200	15	6	15	6
Carbon Disulfide	2,700				
1,1-Dichloroethene	400				
1,1-Dichloroethane	200				
1,2-Dichloroethene (total)	300				
Chloroform	300				
1,2-Dichloroethane	100				
2-Butanone	300				
1,1,1-Trichloroethane	800	26			
Carbon Tetrachloride	600				
Bromodichloromethane	—				
1,2-Dichloropropane	—				
cis-1,3-Dichloropropene	—				
Trichloroethene	700				
Dibromochloromethane	—				
1,1,2-Trichloroethane	—				
Benzene	60				
trans-1,3-Dichloropropene	—				
Bromoform	—				
4-Methyl-2-Pentanone	1,000				
2-Hexanone	—				
Tetrachloroethene	1,400				
1,1,2,2-Tetrachloroethane	600				
Toluene	1,500				
Chlorobenzene	1,700				
Ethylbenzene	5,500				
Styrene	—				
Xylene (total)	1,200				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-08-0
Beginning Depth (ft.)		0	0	0
Ending Depth (ft.)		4	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94
Units		UG/KG	UG/KG	UG/KG
Parameter	TBC			
Chloromethane	—			
Bromomethane	—			
Vinyl Chloride	200			
Chloroethane	1,900			
Methylene Chloride	100			
Acetone	200		4	13
Carbon Disulfide	2,700			
1,1-Dichloroethene	400			
1,1-Dichloroethane	200			
1,2-Dichloroethene (total)	300			
Chloroform	300			
1,2-Dichloroethane	100			
2-Butanone	300			
1,1,1-Trichloroethane	800			
Carbon Tetrachloride	600			
Bromodichloromethane	—			
1,2-Dichloropropane	—			
cis-1,3-Dichloropropene	—			
Trichloroethene	700			
Dibromochloromethane	—			
1,1,2-Trichloroethane	—			
Benzene	60			
trans-1,3-Dichloropropene	—			
Bromoform	—			
4-Methyl-2-Pentanone	1,000			
2-Hexanone	—			
Tetrachloroethene	1,400			
1,1,2,2-Tetrachloroethane	600			
Toluene	1,500			
Chlorobenzene	1,700			
Ethylbenzene	5,500			
Styrene	—			
Xylene (total)	1,200			

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001-0 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		22	13	13	22
Parameter	TBC				
Phenol	30				
bis(2-Chloroethyl)ether	—				
2-Chlorophenol	800				
1,3-Dichlorobenzene	1,600				
1,4-Dichlorobenzene	8,500				
1,2-Dichlorobenzene	7,900				
2-Methylphenol	100				
2,2'-oxybis(1-Chloropropane)	—				
4-Methylphenol	900				
N-Nitroso-di-n-propylamine	—				
Hexachloroethane	—				
Nitrobenzene	200				
Isophorone	4,400				
2-Nitrophenol	330				
2,4-Dimethylphenol	—				
bis(2-Chloroethoxy)methane	—				
2,4-Dichlorophenol	400				
1,2,4-Trichlorobenzene	3,400				
Naphthalene	13,000				
4-Chloroaniline	220				
Hexachlorobutadiene	—				
4-Chloro-3-methylphenol	240				
2-Methylnaphthalene	36,400				
Hexachlorocyclopentadiene	—				
2,4,6-Trichlorophenol	—				
2,4,5-Trichlorophenol	100				
2-Chloronaphthalene	—				
2-Nitroaniline	430				
Dimethylphthalate	2,000				
Acenaphthylene	41,000				
2,6-Dinitrotoluene	1,000				
3-Nitroaniline	500				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001-0 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		22	13	13	22
Parameter	TBC				
Acenaphthene	50,000				
2,4-Dinitrophenol	200				
4-Nitrophenol	100				
Dibenzofuran	6,200				
2,4-Dinitrotoluene	—				
Diethylphthalate	7,100				
4-Chlorophenyl-phenylether	—				
Fluorene	50,000				
4-Nitroaniline	—				
4,6-Dinitro-2-methylphenol	—				
N-Nitrosodiphenylamine	—				
4-Bromophenyl-phenylether	—				
Hexachlorobenzene	410				
Pentachlorophenol	1,000				
Phenanthrene	50,000				
Anthracene	50,000				
Carbazole	—				
Di-n-butylphthalate	8,100				
Fluoranthene	50,000				
Pyrene	50,000				
Butylbenzylphthalate	50,000				
3,3'-Dichlorobenzidine	—				
Benzo(a)anthracene	224				
Chrysene	400				
bis(2-Ethylhexyl)phthalate	50,000				
Di-n-octylphthalate	50,000				
Benzo(b)fluoranthene	1,100				
Benzo(k)fluoranthene	1,100				
Benzo(a)pyrene	61				
Indeno(1,2,3-cd)pyrene	3,200				
Dibenz(a,h)anthracene	14				
Benzo(g,h,i)perylene	50,000				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	1.5
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	07-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		25	17	12	8
Parameter	TBC				
Phenol	30				
bis(2-Chloroethyl)ether	—				
2-Chlorophenol	800				
1,3-Dichlorobenzene	1,600				
1,4-Dichlorobenzene	8,500				
1,2-Dichlorobenzene	7,900				
2-Methylphenol	100				
2,2'-oxybis(1-Chloropropane)	—				
4-Methylphenol	900				
N-Nitroso-di-n-propylamine	—				
Hexachloroethane	—				
Nitrobenzene	200				
Isophorone	4,400				
2-Nitrophenol	330				
2,4-Dimethylphenol	—				
bis(2-Chloroethoxy)methane	—				
2,4-Dichlorophenol	400				
1,2,4-Trichlorobenzene	3,400				
Naphthalene	13,000				
4-Chloroaniline	220				
Hexachlorobutadiene	—				
4-Chloro-3-methylphenol	240				
2-Methylnaphthalene	36,400				
Hexachlorocyclopentadiene	—				
2,4,6-Trichlorophenol	—				
2,4,5-Trichlorophenol	100				
2-Chloronaphthalene	—				
2-Nitroaniline	430				
Dimethylphthalate	2,000				
Acenaphthylene	41,000				
2,6-Dinitrotoluene	1,000				
3-Nitroaniline	500				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	1.5
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	07-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		25	17	12	8
Parameter	TBC				
Acenaphthene	50,000				
2,4-Dinitrophenol	200				
4-Nitrophenol	100				
Dibenzofuran	6,200				
2,4-Dinitrotoluene	—				
Diethylphthalate	7,100	1100		105	
4-Chlorophenyl-phenylether	—				
Fluorene	50,000				
4-Nitroaniline	—				
4,6-Dinitro-2-methylphenol	—				
N-Nitrosodiphenylamine	—				
4-Bromophenyl-phenylether	—				
Hexachlorobenzene	410				
Pentachlorophenol	1,000				
Phenanthrene	50,000				
Anthracene	50,000				
Carbazole	—				
Di-n-butylphthalate	8,100				120
Fluoranthene	50,000				
Pyrene	50,000				
Butylbenzylphthalate	50,000				
3,3'-Dichlorobenzidine	—				
Benzo(a)anthracene	224				
Chrysene	400				
bis(2-Ethylhexyl)phthalate	50,000				
Di-n-octylphthalate	50,000				
Benzo(b)fluoranthene	1,100				
Benzo(k)fluoranthene	1,100				
Benzo(a)pyrene	61				
Indeno(1,2,3-cd)pyrene	3,200				
Dibenz(a,h)anthracene	14				
Benzo(g,h,i)perylene	50,000				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-07-0 RE	SB-34-08-0
Beginning Depth (ft.)		0	0	0	0
Ending Depth (ft.)		4	2	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		9	22	22	14
Parameter	TBC				
Phenol	30				
bis(2-Chloroethyl)ether	—				
2-Chlorophenol	800				
1,3-Dichlorobenzene	1,600				
1,4-Dichlorobenzene	8,500				
1,2-Dichlorobenzene	7,900				
2-Methylphenol	100				
2,2'-oxybis(1-Chloropropane)	—				
4-Methylphenol	900				
N-Nitroso-di-n-propylamine	—				
Hexachloroethane	—				
Nitrobenzene	200				
Isophorone	4,400				
2-Nitrophenol	330				
2,4-Dimethylphenol	—				
bis(2-Chloroethoxy)methane	—				
2,4-Dichlorophenol	400				
1,2,4-Trichlorobenzene	3,400				
Naphthalene	13,000				
4-Chloroaniline	220				
Hexachlorobutadiene	—				
4-Chloro-3-methylphenol	240				
2-Methylnaphthalene	36,400				
Hexachlorocyclopentadiene	—				
2,4,6-Trichlorophenol	—				
2,4,5-Trichlorophenol	100				
2-Chloronaphthalene	—				
2-Nitroaniline	430				
Dimethylphthalate	2,000				
Acenaphthylene	41,000				
2,6-Dinitrotoluene	1,000				
3-Nitroaniline	500				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-07-0 RE	SB-34-08-0
Beginning Depth (ft.)		0	0	0	0
Ending Depth (ft.)		4	2	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		9	22	22	14
Parameter	TBC				
Acenaphthene	50,000				
2,4-Dinitrophenol	200				
4-Nitrophenol	100				
Dibenzofuran	6,200				
2,4-Dinitrotoluene	—				
Diethylphthalate	7,100				
4-Chlorophenyl-phenylether	—				
Fluorene	50,000				
4-Nitroaniline	—				
4,6-Dinitro-2-methylphenol	—				
N-Nitrosodiphenylamine	—				
4-Bromophenyl-phenylether	—				
Hexachlorobenzene	410				
Pentachlorophenol	1,000				
Phenanthrene	50,000				
Anthracene	50,000				
Carbazole	—				
Di-n-butylphthalate	8,100				
Fluoranthene	50,000				
Pyrene	50,000				
Butylbenzylphthalate	50,000				
3,3'-Dichlorobenzidine	—				
Benzo(a)anthracene	224				
Chrysene	400				
bis(2-Ethylhexyl)phthalate	50,000				
Di-n-octylphthalate	50,000				
Benzo(b)fluoranthene	1,100				
Benzo(k)fluoranthene	1,100				
Benzo(a)pyrene	61				
Indeno(1,2,3-cd)pyrene	3,200				
Dibenz(a,h)anthracene	14				
Benzo(g,h,i)perylene	50,000				

Only detected results reported.
TBC - "To Be Considered" criteria that are not legally binding. Based on NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January 1994.
— - No TBC available.
[a] - Exceeds TBC.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		WB-MW-34-003-0	WB-MW-34-003-5	WB-MW-34-001-0	WB-MW-34-001-0 DUP
Beginning Depth (ft.)		0	5	0	0
Ending Depth (ft.)		2	7	2	2
Date Sampled		15-Nov-94	15-Nov-94	14-Nov-94	14-Nov-94
Units		MG/KG	MG/KG	MG/KG	MG/KG
Parameter	TBC				
Aluminum	8510 (SB)	2350	26300 [a]	7170	7910
Antimony	12.6 (SB)				
Arsenic	7.5 **	1.3		3.4	3.2
Barium	300 **	12.6	282	53.5	64.5
Beryllium	0.74 (SB)	0.12	1.2 [a]	0.37	0.39
Cadmium	1.3 (SB)		1.5 [a]	2 [a]	1.6 [a]
Calcium	30200 (SB)	2810	7450	3630	2770
Chromium	19.5 (SB)	3.8	55.7 [a]	19.5	15.6
Cobalt	30 **	1.8	27.4	8.7	9
Copper	44.1 (SB)	1.4	41.8	16.8	11.6
Iron	36700 (SB)	4460	40800 [a]	16700	14200
Lead	79.4 (SB)	4.7	7	6.8	5.6
Magnesium	3340 (SB)	1220	14400 [a]	2560	2830
Manganese	474 (SB)	57	680 [a]	188	218
Mercury	0.1 **				
Nickel	13 **	3.4	50.9 [a]	17.1 [a]	14.3 [a]
Potassium	929 (SB)	333	6830 [a]	1370 [a]	1510 [a]
Selenium	2 **		1.7	0.82	
Silver	ND (SB)				
Sodium	520 (SB)	225	940 [a]	436	302
Thallium	ND (SB)				
Vanadium	150 **	6.4	69.3	21.9	23.8
Zinc	63.4 (SB)	16.6	110 [a]	R	R

Only detected results reported.

TBC - "To Be Considered" criteria that are not legally binding. Determined as per NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

[a] - Exceeds TBC.

SB - Site Background. (95% Upper Tolerance Limit Value from Background Surface Soil & Groundwater Survey: URS 1995)

** - NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

R - The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		WB-MW-34-001-4	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		4	0	0	0
Ending Depth (ft.)		6	2	2	4
Date Sampled		14-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Units		MG/KG	MG/KG	MG/KG	MG/KG
Parameter	TBC				
Aluminum	8510 (SB)	13000 [a]	5110	3020	2110
Antimony	12.6 (SB)				
Arsenic	7.5 **	2.9			1.1
Barium	300 **	123	32.3	18.8	13.7
Beryllium	0.74 (SB)	0.64	0.22		0.11
Cadmium	1.3 (SB)	1.8 [a]			
Calcium	30200 (SB)	4420	879	1000	5080
Chromium	19.5 (SB)	25.6 [a]	7.3	5.7	2.9
Cobalt	30 **	17.2	3.4	2.4	2.4
Copper	44.1 (SB)	22.7	2.8		2.9
Iron	36700 (SB)	24800	7770	4480	5650
Lead	79.4 (SB)	6.7	5.5	1.6	3.4
Magnesium	3340 (SB)	6490 [a]	1250	886	1560
Manganese	474 (SB)	456	59.2	36.2	95.6
Mercury	0.1 **				
Nickel	13 **	27.6 [a]	7.1	3.5	3.9
Potassium	929 (SB)	3120 [a]	574	418	364
Selenium	2 **				
Silver	ND (SB)				
Sodium	520 (SB)	491	196	178	167
Thallium	ND (SB)				
Vanadium	150 **	42.1	13.8	6.7	7.4
Zinc	63.4 (SB)	R	22.2	40.8	20.2

Only detected results reported.

TBC - "To Be Considered" criteria that are not legally binding. Determined as per NYSDEC TAGM: Determination of Soil Cleanup Objectives and Cleanup Levels, HRW-94-4046, January, 1994.

[a] - Exceeds TBC.

SB - Site Background. (95% Upper Tolerance Limit Value from Background Surface Soil & Groundwater Survey: URS 1995)

** - NYSDEC recommended soil cleanup objective (NYSDEC HWR-94-4046; Appendix A, Table 4)

R - The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE A-1

ANALYTICAL RESULTS
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-08-0
Beginning Depth (ft.)		0	0	0
Ending Depth (ft.)		4	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94
Units		MG/KG	MG/KG	MG/KG
Parameter	TBC			
Aluminum	8510 (SB)	2590	9510 [a]	2840
Antimony	12.6 (SB)			
Arsenic	7.5 **			
Barium	300 **	12	79.3	19.3
Beryllium	0.74 (SB)	0.12	0.36	0.05
Cadmium	1.3 (SB)			
Calcium	30200 (SB)	1130	5890	729
Chromium	19.5 (SB)	5	19.1	4.2
Cobalt	30 **	2.8	10.1	2.2
Copper	44.1 (SB)	1.7	13.2	
Iron	36700 (SB)	8530	15700	4510
Lead	79.4 (SB)	2.4	4.9	3.9
Magnesium	3340 (SB)	727	4450 [a]	703
Manganese	474 (SB)	31.2	310	35.2
Mercury	0.1 **			
Nickel	13 **	3.3	17.2 [a]	2.3
Potassium	929 (SB)	265	1800 [a]	284
Selenium	2 **		1.3	
Silver	ND (SB)			
Sodium	520 (SB)	157	280	186
Thallium	ND (SB)			
Vanadium	150 **	12	22.5	7.3
Zinc	63.4 (SB)	26.2	64.3 [a]	36.6

Only detected results reported.
TBC - "To Be Considered"
criteria that are not legally binding.
Determined as per NYSDEC TAGM:
Determination of Soil Cleanup
Objectives and Cleanup Levels,
HRW-94-4046, January, 1994.
[a] - Exceeds TBC.
SB - Site Background. (95% Upper
Tolerance Limit Value from
Background Surface Soil &
Groundwater Survey: URS 1995)
** - NYSDEC recommended soil cleanup
objective (NYSDEC HWR-94-4046;
Appendix A, Table 4)

Appendix B

Sample Data Summary

TABLE B-1

SOUTH CLEAR ZONE (SS-034)
SAMPLE DATA SUMMARY

Sample I.D. Identifier	Sample Matrix	Analyses Performed (indicated by date sampled)			Sample Depth (ft.)	Organic Screening HNu (ppm)	Description
		TCL VOC	TCL SVOC	TAL Metals			
WB-MW-34-001-0	Surface Soil	14-NOV-94	14-NOV-94	14-NOV-94	0.0 — 2.0	0.2	Brown loamy fine sand
WB-MW-34-001-0 Dup	Surface Soil	14-NOV-94	14-NOV-94	14-NOV-94	0.0 — 2.0	0.2	Brown loamy fine sand
WB-MW-34-001-4	Subsurface Soil	14-NOV-94	14-NOV-94	14-NOV-94	4.0 — 6.0	0.2	Brown to gray sandy silt and silty clay
SB-34-02-0	Surface Soil	16-NOV-94	16-NOV-94	16-NOV-94	0.0 — 2.0	0.1	Dark brown fine sandy loam; and orange, gray, and olive silty clay
WB-MW-34-003-0	Surface Soil	15-NOV-94	15-NOV-94	15-NOV-94	0.0 — 2.0	0.5	Dark brown to orange-brown silty gravelly fine to coarse sand
WB-MW-34-003-5	Subsurface Soil	15-NOV-94	15-NOV-94	15-NOV-94	5.0 — 7.0	0.1	Olive to gray silty clay, trace sand
SB-34-04-0	Surface Soil	16-NOV-94	16-NOV-94	16-NOV-94	0.0 — 2.0	0.2	Dark brown fine sandy loam; and orange, gray, and olive silty clay
SB-34-05-0	Surface Soil	16-NOV-94	--	16-NOV-94	0.0 — 4.0	0.2	Dark brown to black silty gravelly fine to coarse sand; and orange, olive, and gray silty clay
SB-34-05-0 RE	Surface Soil	--	07-DEC-94	--	0.0 — 1.5	0.2	Dark brown to black silty gravelly fine to coarse sand
SB-34-06-0	Surface Soil	16-NOV-94	16-NOV-94	16-NOV-94	0.0 — 4.0	0.2	Dark brown to black silty gravelly fine to coarse sand; and orange, olive, and gray silty clay
SB-34-07-0	Surface Soil	16-NOV-94	16-NOV-94	16-NOV-94	0.0 — 2.0	0.2	Dark brown to black silty gravelly fine to coarse sand
SB-34-08-0	Surface Soil	16-NOV-94	16-NOV-94	16-NOV-94	0.0 — 2.0	0.2	Dark brown fine sandy loam; and orange, olive, and gray silty clay

Appendix C

Soil Boring Logs

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. WB-MW-34-001

PROJECT: SS-034 South Clear Zone
CLIENT: Plattsburgh Air Force Base
BORING CONTRACTOR: Tri-State Drilling & Boring
SHEET NO. 1 OF 1
JOB NO. : 053529I.21
BORING LOCATION: N-1690652.504 E-728952.679
GROUND ELEVATION: 147.23'
DATE STARTED: 11-14-94 (1245)
DATE FINISHED: 11-14-94 (1500)
DRILLER: Ray Gilfillan
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE LENHARDT

GROUND WATER:

DATE	TIME	LEV	TYPE
11/14	1530	ND	Not detected in augers at completion

	CAS.	SAMP	CORE	TUBE
TYPE	HSA	SS		SHELBY
DIA.	6¼"	2" & 3"		3"
WT.		140*		100–
FALL		30"		150psi

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY ROD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
1		*1	3" SS	2 3	55	DARK BROWN	LOOSE	SANDY LOAM (topsoil)	SM	0.2	Slightly moist
2				4 5		ORANGISH BROWN AND GRAY		SILTY FINE SAND, trace clay	↓	0.1	
		+2	2" SS	2 1	55		SOFT	SANDY SILTY CLAY	CL	0.2	angular blocky structure
				3 4		BROWN, ORANGE, GRAY	MEDIUM STIFF	↓	↓	NT	
5		*3	3" SS	9 6	100		STIFF TO VERY STIFF			0.2	
6				10 17						0.0	Moist
		+4	2" SS	3 4	100	GRAY	STIFF	SILTY CLAY, trace sand	CH	0.2	
				6 6				↓	↓	0.0	
		5	2" SS	2 2	100		MEDIUM STIFF	trace to some sand		0.2	
10				2 3				↓	CL	0.0	plastic
		+6	3" SHELBY TUBE	24" PU SH	100		SOFT			0.0	Wet @ ~11'
		7	2" SS	1 1	100					NT	
				2 2						0.1	
15		8	2" SS	3 2	75	DARK GRAY	MEDIUM STIFF	trace gravel		NT	Subrounded to subangular limestone gravel
				3 3				↓		0.1	
		+9	2" SS	2 3	70					0.1	
18				5 9			STIFF			0.0	
20								BORING COMPLETED AT 18' DEPTH (augers advanced to 16' depth, sampled to 18' depth)			NT = Not taken
25								*ENVIRONMENTAL SAMPLES COLLECTED FROM 0-2' and 4'-6' SS.			
30								+GEOTECHNICAL SAMPLES COLLECTED FROM 2'-4', 6'-8', 10'-12', and 16'-18' SS.			
35											

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASS USING 6¼" HSA. WELL MW-34-001 INSTALLED IN BOREHOLE AND SUBSEQUENTLY ABANDONED ON 11/15/94 AS WELL [illegible] APPROPRIATE WATER.

PROJECT NO. 053529I.21
D-1
BORING NO. WB-MW-34-001

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-02

PROJECT: SS-034 South Clear Zone
SHEET NO. 1 OF 1
CLIENT: Plattsburgh Air Force Base
JOB NO. : 0535291.21
BORING CONTRACTOR: Tri-State Drilling & Boring
BORING LOCATION: N-1690109.191 E-729022.141
GROUND WATER: not encountered
GROUND ELEVATION: 145.55'
DATE STARTED: 11-16-94 (1057)
DATE FINISHED: 11-16-94 (1115)
DRILLER: Ray Gilfillan
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE LENHARDT

DATE	TIME	LEV	TYPE		CAS.	SAMP	CORE	TUBE
				TYPE		SS		
				DIA.		2" & 3"		
				WT.		140#		
				FALL		30"		

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	DESCRIPTION: COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
1	S	*1	3" SS	1	3	75	DARK BROWN	LOOSE TO MEDIUM DENSE	FINE SANDY LOAM (topsoil)	SM	0.1	Slightly moist
	S			7	9		ORANGE, OLIVE, GRAY	MEDIUM STIFF TO STIFF	SILTY CLAY (orange mottles, angular blocky structure)	CL	NT	
	S	2	2" SS	4	4	70					0.0	
4	S			4	6						0.0	
5								BORING COMPLETED AT 4' depth.				NT = Not taken
								*ENVIRONMENTAL SAMPLE collected from 0-2' SS.				
10												
15												
20												
25												
30												
35												

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES.

PROJECT NO. 0535291.21
BORING NO. SB-34-02

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. WB-MW-34-003

PROJECT: SS-034 South Clear Zone
SHEET NO. 1 OF 1
CLIENT: Plattsburgh Air Force Base
JOB NO. : 0535291.21
BORING CONTRACTOR: Tri-State Drilling & Boring
BORING LOCATION: N-1690131.686 E-729111.985
GROUND WATER: not encountered
GROUND ELEVATION: 146.75'
DATE STARTED: 11-15-94 (0910)
DATE FINISHED: 11-15-94 (1110)
DRILLER: Ray Gilfillan
GEOLOGIST: Steven Moeller
REVIEWED BY: DUANE LENHARDT

DATE	TIME	LEV	TYPE		CASING	SAMPLER	CORE	TUBE
				TYPE	HSA	SS		SHELBY
				DIA.	6¼"	2" & 3"		3"
				WT.		140*		300
				FALL		30"		psi

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	COLOR	CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
0.5		*+1	3" SS	3 / 7	9 / 8	75	DK. BROWN ORANGISH BROWN, DARK BROWN	LOOSE TO MEDIUM DENSE	FINE SANDY LOAM (topsoil)	SM	0.1 / 0.5	Slightly moist
3									SILTY GRAVELLY FINE TO COARSE SAND			
		2	2" SS	4 / 7	6 / 11	70	OLIVE TO GRAY	STIFF TO VERY STIFF	SILTY CLAY, trace sand	CL	0.1 / 0.0	angular blocky structure
5		*3	3" SS	10 / 14	12 / 18	100					0.1 / 0.1	
		+4	3" SHELBY TUBE	24" PU	SH	80				CH	0.1 / NT	Moist
10		5	2" SS	2 / 4	2 / 4	100		MEDIUM STIFF			0.1 / 0.0	
11									BORING COMPLETED AT 11' depth (augers advanced to 9' depth, sampled to 11')			NT = Not taken
15									*ENVIRONMENTAL SAMPLES collected from 0-2' and 5'-7' SS.			
20									+GEOTECHNICAL SAMPLES collected from 0-2' and 7'-9' SS.			
25												
30												
35												

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS USING 6¼" HSA. NO WELL WAS INSTALLED IN THIS BORING. BOREHOLE WAS BACKFILLED WITH CUTTINGS AND BENTONITE PELLETS.

PROJECT NO. 0535291.21
BORING NO. WB-MW-34-003

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-04

PROJECT: SS-034 SOUTH CLEAR ZONE
CLIENT: PLATTSBURG AIR FORCE BASE
BORING CONTRACTOR: TRI-STATE DRILLING & BORING
GROUND WATER: NOT ENCOUNTERED

DATE	TIME	LEV	TYPE

	CAS.	SAMP	CORE	TUBE
TYPE		SS		
DIA.		2"&3"		
WT.		140#		
FALL		30"		

• POCKET PENETROMETER READING

SHEET NO. 1 OF 1
JOB NO.: 0535291.02
BORING LOCATION: N-1690291.313 E-729116.187
GROUND ELEVATION: 145.65'
DATE STARTED: 11-16-94 (1134)
DATE FINISHED: 11-16-94 (1149)
DRILLER: RAY GILFILLAN
GEOLOGIST: STEVEN MOELLER
REVIEWED BY: DUANE LENHARDT

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY ROD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE / HEADSPACE HEADSPACE	REMARKS
0.5		*1	3" SS	2 3 / 12 13	75	DARK BROWN	LOOSE	FINE SANDY LOAM (TOPSOIL)	SM	0.1 / 0.2	SLIGHTLY MOIST
4		2	2" SS	4 5 / 4 6	40	OLIVE GRAY, ORANGE	STIFF	SILTY CLAY (ORANGE MOTTLES, ANGULAR BLOCKY STRUCTURE)	CL	0.1 / 0.3	
5								BOREHOLE COMPLETED AT 4' DEPTH.			
								* ENVIRONMENTAL SAMPLE COLLECTED FROM 0-2' SS.			
10											
15											
20											
25											
30											
35											

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES

PROJECT NO. 0535291.21
BORING NO. SB-34-04

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-05

PROJECT: SS-034 SOUTH CLEAR ZONE	SHEET NO. 1 OF 1
CLIENT: PLATTSBURG AIR FORCE BASE	JOB NO.: 0535291.21
BORING CONTRACTOR: TRI-STATE DRILLING & BORING	BORING LOCATION: N-1690456.486 E-729042.602
GROUND WATER: NOT ENCOUNTERED	GROUND ELEVATION: 147.78'
DATE STARTED: 11-16-94 (1230)	
DATE FINISHED: 11-16-94 (1251)	
DRILLER: RAY GILFILLAN	
GEOLOGIST: STEVEN MOELLER	
REVIEWED BY: DUANE LENHARDT	

DATE	TIME	LEV	TYPE		CAS.	SAMP	CORE	TUBE
				TYPE		SS		
				DIA.		2"&3"		
				WT.		140#		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (PPM)	REMARKS
2	OS / SO	*1	3" SS	5 / 25	24 / 15	55	BROWN / DK BROWN TO BLACK	MEDIUM DENSE TO DENSE	SILTY GRAVELLY FINE TO COARSE SAND	SM	0.2 / 0.2	SLIGHTLY MOIST
3		*2	2" SS	4 / 7	6 / 11	55	ORANGE/ BROWN/ OLIVE	LOOSE	FINE SAND, trace med. sand	SP	0.2 / 0.2	
5		3	2" SS	6 / 14	9 / 20	70	GRAY, ORANGE OLIVE	VERY STIFF	SILTY CLAY (ORANGE MOTTLES ANGULAR BLOCKY STRUCTURE)	CL	0.0 / 0.1	
									BOREHOLE COMPLETED @ 6' DEPTH.			
									* ENVIRONMENTAL SAMPLES COLLECTED FROM 0-2' SS AND 2-4' SS.			

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES

PROJECT NO. 0535291.21
BORING NO. SB-34-05

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-06

PROJECT: SS-034 SOUTH CLEAR ZONE
SHEET NO. 1 OF 1
CLIENT: PLATTSBURG AIR FORCE BASE
JOB NO.: 053529 1.21
BORING CONTRACTOR: TRI-STATE DRILLING & BORING
BORING LOCATION: N-1690545.150 E-728986.236
GROUND WATER: NOT ENCOUNTERED
GROUND ELEVATION: 147.53'
DATE STARTED: 11-16-94 (1313)
DATE FINISHED: 11-16-94 (1322)
DRILLER: RAY GILFILLAN
GEOLOGIST: STEVEN MOELLER
REVIEWED BY: DUANE LENHARDT

DATE	TIME	LEV	TYPE		CAS.	SAMP	CORE	TUBE
				TYPE		SS		
				DIA.		2"&3"		
				WT.		140#		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY RQD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLES HEADSPACE (ppm)	REMARKS
1	0-S	*1	3" SS	4	7	95	DK BRN	LOOSE TO MEDIUM DENSE	SILTY GRAVELLY F-C SAND	SM	0.2	SLIGHTLY MOIST
2				6	6		ORANGE		FINE SAND, trace med. sand	SP	0.2	
3		*2	2" SS	2	3	80	ORANGE GRAY, OLIVE	STIFF	SILTY CLAY (ORANGE MOTTLES, ANGULAR BLOCKY STRUCTURE)	CL	0.1	MOIST
4				6	7						0.1	
5									BORING COMPLETED AT 4' DEPTH.			
									* ENVIRONMENTAL SAMPLE COLLECTED FROM 0-2' AND 2-4' SS.			
10												
15												
20												
25												
30												
35												

A-3205

COMMENTS: BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES

PROJECT NO. 053529 1.21
BORING NO. SB-34-06

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-07

PROJECT: SS-034 SOUTH CLEAR ZONE	**SHEET NO.** 1 **OF** 1
CLIENT: PLATTSBURG AIR FORCE BASE	**JOB NO.:** 053529I.21
BORING CONTRACTOR: TRI-STATE DRILLING & BORING	**BORING LOCATION:** N-1690436.133 E-728957.124
GROUND WATER: NOT ENCOUNTERED	**GROUND ELEVATION:** 147.78'
DATE STARTED: 11-16-94 (1345)	
DATE FINISHED: 11-16-94 (1355)	
DRILLER: RAY GILFILLAN	
GEOLOGIST: STEVEN MOELLER	
REVIEWED BY: DUANE LENHARDT	

DATE	TIME	LEV	TYPE		CAS.	SAMP	CORE	TUBE
				TYPE		SS		
				DIA.		2"&3"		
				WT.		140#		
				FALL		30"		
				* POCKET PENETROMETER READING				

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY ROD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID @ SAMP/BP HOPPER (ppm)	REMARKS
2	D.S. S.D.	*+1	3" SS	2	6	70	DK BRN TAN OLIVE	LOOSE TO MEDIUM DENSE	SILTY GRAVELLY FINE TO COARSE SAND	SM	0.3/0.1	SLIGHTLY MOIST
4	S.S. S.S.	2	2" SS	5	5	90	OLIVE, GRAY, ORANGE	STIFF	SILTY CLAY (ORANGE MOTTLES, ANGULAR BLOCKY STRUCTURE)	CL	0.2/0.1	
5									BORING COMPLETED AT 4' DEPTH.			
									* ENVIRONMENTAL SAMPLE COLLECTED FROM 0-2' SS.			
10									+ GEOTECHNICAL SAMPLE collected from 0-2' SS.			
15												
20												
25												
30												
35												

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES.

PROJECT NO. 053529I.21
BORING NO. SB-34-07

URS CONSULTANTS, Inc.

TEST BORING LOG
BORING NO. SB-34-08

PROJECT: SS-034 SOUTH CLEAR ZONE
CLIENT: PLATTSBURG AIR FORCE BASE
BORING CONTRACTOR: TRI-STATE DRILLING & BORING
GROUND WATER: NOT ENCOUNTERED

DATE	TIME	LEV	TYPE

	CAS.	SAMP	CORE	TUBE
TYPE		SS		
DIA.		2"&3"		
WT.		140#		
FALL		30"		

* POCKET PENETROMETER READING

SHEET NO. 1 OF 1
JOB NO.: 0535291.21
BORING LOCATION: N-1690304.809 E-728984.372
GROUND ELEVATION: 146.55'
DATE STARTED: 11-16-94 (1011)
DATE FINISHED: 11-16-94 (1029)
DRILLER: RAY GILFILLAN
GEOLOGIST: STEVEN MOELLER
REVIEWED BY: DUANE LENHARDT

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	PID SAMPLE HEADSPACE (ppm)	REMARKS
1		*1	3" SS	2 4	75	DARK BROWN	LOOSE	FINE SANDY LOAM (TOPSOIL)	SM	0.1	SLIGHTLY MOIST
				10 15		OLIVE, GRAY, ORANGE	STIFF	SILTY CLAY (ORANGE MOTTLES, ANGULAR BLOCKY STRUCTURE)	CL	0.2	
		2	2" SS	3 4	85					0.1	
4				9 8						0.9	
5								BORING COMPLETED AT 4' DEPTH.			
								* ENVIRONMENTAL SAMPLE COLLECTED FROM 0-2' SS.			
10											
15											
20											
25											
30											
35											

A-3205

COMMENTS BOREHOLE ADVANCED WITH A MOBILE B-57 RIG ON A 2WD TRUCK CHASSIS. NO HSA USED. BOREHOLE BACKFILLED WITH BENTONITE FLAKES

PROJECT NO. 0535291.21
BORING NO. SB-34-08

Appendix D

Validation Summary Tables

EXPLANATION OF VALIDATION QUALIFIERS

The following are definitions of the validation qualifiers assigned to results during the data review process.

U - Analysis was conducted for the analyte was analyzed for but was not detected.

J - Indicates an estimated concentration because results were either below the sample quantitation limit or quality control criteria were not met.

R - The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and/or quality control criteria established by the USEPA. The presence or absence of the analyte could not be verified.

***** - The compound was detected but was determined unusable due to contamination in the associated QC blank.

[] - The sample result was less than the contract required detection limit but greater than or equal to the instrument detection limit.

J:/35291/South-Zn.qcs:mmtcp
03-07-95:08:47

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Date Analyzed		16-Nov-94	17-Nov-94	17-Nov-94	19-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		22	13	13	22
Parameter	Class				
Chloromethane	VOC	12 U	11 U	11 U	13 U
Bromomethane	VOC	12 U	11 U	11 U	13 U
Vinyl Chloride	VOC	12 U	11 U	11 U	13 U
Chloroethane	VOC	12 U	11 U	11 U	13 U
Methylene Chloride	VOC	12 U	11 U	11 U	13 U
Acetone	VOC	12 UJ	3 J	11 UJ	12 J
Carbon Disulfide	VOC	12 U	11 U	11 U	13 U
1,1-Dichloroethene	VOC	12 U	11 U	11 U	13 U
1,1-Dichloroethane	VOC	12 U	11 U	11 U	13 U
1,2-Dichloroethene (total)	VOC	12 U	11 U	11 U	13 U
Chloroform	VOC	12 U	11 U	11 U	13 U
1,2-Dichloroethane	VOC	12 U	11 U	11 U	13 U
2-Butanone	VOC	12 UJ	11 UJ	11 UJ	13 U
1,1,1-Trichloroethane	VOC	12 U	11 U	11 U	34
Carbon Tetrachloride	VOC	12 U	11 U	11 U	13 U
Bromodichloromethane	VOC	12 U	11 U	11 U	13 U
1,2-Dichloropropane	VOC	12 U	11 U	11 U	13 U
cis-1,3-Dichloropropene	VOC	12 U	11 U	11 U	13 U
Trichloroethene	VOC	12 U	11 U	11 U	13 U
Dibromochloromethane	VOC	12 U	11 U	11 U	13 U
1,1,2-Trichloroethane	VOC	12 U	11 U	11 U	13 U
Benzene	VOC	12 U	11 U	11 U	13 U
trans-1,3-Dichloropropene	VOC	12 U	11 U	11 U	13 U
Bromoform	VOC	12 U	11 U	11 U	13 U
4-Methyl-2-Pentanone	VOC	12 U	11 U	11 U	13 U
2-Hexanone	VOC	12 U	11 U	11 U	13 U
Tetrachloroethene	VOC	12 U	11 U	11 U	13 U
1,1,2,2-Tetrachloroethane	VOC	12 U	11 U	11 U	13 U
Toluene	VOC	12 U	11 U	11 U	13 U
Chlorobenzene	VOC	12 U	11 U	11 U	13 U
Ethylbenzene	VOC	12 U	11 U	11 U	13 U
Styrene	VOC	12 U	11 U	11 U	13 U
Xylene (total)	VOC	12 U	11 U	11 U	13 U
Associated Method Blank		VBLKS3	VBLKS3	VBLKS3	VBLKS2
Associated Trip Blank		NA	NA	NA	NA
Associated Rinse Blank		FB34-941114-S	FB34-941114-S	FB34-941114-S	NA

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	4
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Date Analyzed		18-Nov-94	19-Nov-94	19-Nov-94	19-Nov-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		25	17	12	7
Parameter	Class				
Chloromethane	VOC	13 U	12 U	11 U	11 U
Bromomethane	VOC	13 U	12 U	11 U	11 U
Vinyl Chloride	VOC	13 U	12 U	11 U	11 U
Chloroethane	VOC	13 U	12 U	11 U	11 U
Methylene Chloride	VOC	13 U	12 U	11 U	11 U
Acetone	VOC	15	6 J	15	6 J
Carbon Disulfide	VOC	13 U	12 U	11 U	11 U
1,1-Dichloroethene	VOC	13 U	12 UJ	11 UJ	11 UJ
1,1-Dichloroethane	VOC	13 U	12 U	11 U	11 U
1,2-Dichloroethene (total)	VOC	13 U	12 U	11 U	11 U
Chloroform	VOC	13 U	12 U	11 U	11 U
1,2-Dichloroethane	VOC	13 U	12 U	11 U	11 U
2-Butanone	VOC	13 U	12 U	11 U	11 U
1,1,1-Trichloroethane	VOC	26	12 U	11 U	11 U
Carbon Tetrachloride	VOC	13 U	12 U	11 U	11 U
Bromodichloromethane	VOC	13 U	12 U	11 U	11 U
1,2-Dichloropropane	VOC	13 U	12 U	11 U	11 U
cis-1,3-Dichloropropene	VOC	13 U	12 U	11 U	11 U
Trichloroethene	VOC	13 U	12 U	11 U	11 U
Dibromochloromethane	VOC	13 U	12 U	11 U	11 U
1,1,2-Trichloroethane	VOC	13 U	12 U	11 U	11 U
Benzene	VOC	13 U	12 U	11 U	11 U
trans-1,3-Dichloropropene	VOC	13 U	12 U	11 U	11 U
Bromoform	VOC	13 U	12 U	11 U	11 U
4-Methyl-2-Pentanone	VOC	13 U	12 U	11 U	11 U
2-Hexanone	VOC	13 U	12 U	11 U	11 U
Tetrachloroethene	VOC	13 U	12 U	11 U	11 U
1,1,2,2-Tetrachloroethane	VOC	13 U	12 U	11 U	11 U
Toluene	VOC	13 U	12 U	11 U	11 U
Chlorobenzene	VOC	13 U	12 U	11 U	11 U
Ethylbenzene	VOC	13 U	12 U	11 U	11 U
Styrene	VOC	13 U	12 U	11 U	11 U
Xylene (total)	VOC	13 U	12 U	11 U	11 U
Associated Method Blank		VBLKS1	VBLKS1A	VBLKS1A	VBLKS1A
Associated Trip Blank		NA	NA	NA	NA
Associated Rinse Blank		NA	FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (VOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-08-0
Beginning Depth (ft.)		0	0	0
Ending Depth (ft.)		4	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94
Date Analyzed		19-Nov-94	19-Nov-94	21-Nov-94
Units		UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1
% Moisture		9	22	14
Parameter	Class			
Chloromethane	VOC	11 U	13 U	11 U
Bromomethane	VOC	11 U	13 U	11 U
Vinyl Chloride	VOC	11 U	13 U	11 U
Chloroethane	VOC	11 U	13 U	11 U
Methylene Chloride	VOC	11 U	13 U	11 U
Acetone	VOC	11 U	4 J	13
Carbon Disulfide	VOC	11 U	13 U	11 U
1,1-Dichloroethene	VOC	11 UJ	13 UJ	11 U
1,1-Dichloroethane	VOC	11 U	13 U	11 U
1,2-Dichloroethene (total)	VOC	11 U	13 U	11 U
Chloroform	VOC	11 U	13 U	11 U
1,2-Dichloroethane	VOC	11 U	13 U	11 U
2-Butanone	VOC	11 U	13 U	11 U
1,1,1-Trichloroethane	VOC	11 U	13 U	11 U
Carbon Tetrachloride	VOC	11 U	13 U	11 U
Bromodichloromethane	VOC	11 U	13 U	11 U
1,2-Dichloropropane	VOC	11 U	13 U	11 U
cis-1,3-Dichloropropene	VOC	11 U	13 U	11 U
Trichloroethene	VOC	11 U	13 U	11 U
Dibromochloromethane	VOC	11 U	13 U	11 U
1,1,2-Trichloroethane	VOC	11 U	13 U	11 U
Benzene	VOC	11 U	13 U	11 U
trans-1,3-Dichloropropene	VOC	11 U	13 U	11 U
Bromoform	VOC	11 U	13 U	11 U
4-Methyl-2-Pentanone	VOC	11 U	13 U	11 U
2-Hexanone	VOC	11 U	13 U	11 U
Tetrachloroethene	VOC	11 U	13 U	11 U
1,1,2,2-Tetrachloroethane	VOC	11 U	13 U	11 U
Toluene	VOC	11 U	13 U	11 U
Chlorobenzene	VOC	11 U	13 U	11 U
Ethylbenzene	VOC	11 U	13 U	11 U
Styrene	VOC	11 U	13 U	11 U
Xylene (total)	VOC	11 U	13 U	11 U
Associated Method Blank		VBLKS1A	VBLKS1A	VBLKS2A
Associated Trip Blank		NA	NA	NA
Associated Rinse Blank		FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001-0 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Date Extracted		16-Nov-94	16-Nov-94	16-Nov-94	21-Nov-94
Date Analyzed		28-Nov-94	28-Nov-94	28-Nov-94	05-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		22	13	13	22
Parameter	Class				
Phenol	SVOC	420 U	380 U	380 U	420 U
bis(2-Chloroethyl)ether	SVOC	420 U	380 U	380 U	420 U
2-Chlorophenol	SVOC	420 U	380 U	380 U	420 U
1,3-Dichlorobenzene	SVOC	420 U	380 U	380 U	420 U
1,4-Dichlorobenzene	SVOC	420 U	380 U	380 U	420 U
1,2-Dichlorobenzene	SVOC	420 U	380 U	380 U	420 U
2-Methylphenol	SVOC	420 U	380 U	380 U	420 U
2,2'-oxybis(1-Chloropropane)	SVOC	420 U	380 U	380 U	420 U
4-Methylphenol	SVOC	420 U	380 U	380 U	420 U
N-Nitroso-di-n-propylamine	SVOC	420 U	380 U	380 U	420 U
Hexachloroethane	SVOC	420 U	380 U	380 U	420 U
Nitrobenzene	SVOC	420 U	380 U	380 U	420 U
Isophorone	SVOC	420 U	380 U	380 U	420 U
2-Nitrophenol	SVOC	420 U	380 U	380 U	420 U
2,4-Dimethylphenol	SVOC	420 U	380 U	380 U	420 U
bis(2-Chloroethoxy)methane	SVOC	420 U	380 U	380 U	420 U
2,4-Dichlorophenol	SVOC	420 U	380 U	380 U	420 U
1,2,4-Trichlorobenzene	SVOC	420 U	380 U	380 U	420 U
Naphthalene	SVOC	420 U	380 U	380 U	420 U
4-Chloroaniline	SVOC	420 U	380 U	380 U	420 U
Hexachlorobutadiene	SVOC	420 U	380 U	380 U	420 U
4-Chloro-3-methylphenol	SVOC	420 U	380 U	380 U	420 U
2-Methylnaphthalene	SVOC	420 U	380 U	380 U	420 U
Hexachlorocyclopentadiene	SVOC	420 U	380 U	380 U	420 U
2,4,6-Trichlorophenol	SVOC	420 U	380 U	380 U	420 U
2,4,5-Trichlorophenol	SVOC	1000 U	920 U	920 U	1000 U
2-Chloronaphthalene	SVOC	420 U	380 U	380 U	420 U
2-Nitroaniline	SVOC	1000 U	920 U	920 U	1000 U
Dimethylphthalate	SVOC	420 U	380 U	380 U	420 U
Acenaphthylene	SVOC	420 U	380 U	380 U	420 U
2,6-Dinitrotoluene	SVOC	420 U	380 U	380 U	420 U
3-Nitroaniline	SVOC	1000 UJ	920 UJ	920 UJ	1000 UJ
Associated Method Blank		SBLKS3	SBLKS3	SBLKS3	SBLKS1
Associated Rinse Blank		FB34-941114-S	FB34-941114-S	FB34-941114-S	NA

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-001-0	WB-MW-34-001-0 DUP	WB-MW-34-001-4	WB-MW-34-003-0
Beginning Depth (ft.)		0	0	4	0
Ending Depth (ft.)		2	2	6	2
Date Sampled		14-Nov-94	14-Nov-94	14-Nov-94	15-Nov-94
Date Extracted		16-Nov-94	16-Nov-94	16-Nov-94	21-Nov-94
Date Analyzed		28-Nov-94	28-Nov-94	28-Nov-94	05-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		22	13	13	22
Parameter	Class				
Acenaphthene	SVOC	420 U	380 U	380 U	420 U
2,4-Dinitrophenol	SVOC	1000 U	920 U	920 U	1000 U
4-Nitrophenol	SVOC	1000 U	920 U	920 U	1000 U
Dibenzofuran	SVOC	420 U	380 U	380 U	420 U
2,4-Dinitrotoluene	SVOC	420 U	380 U	380 U	420 U
Diethylphthalate	SVOC	420 U	380 U	380 U	420 U
4-Chlorophenyl-phenylether	SVOC	420 U	380 U	380 U	420 U
Fluorene	SVOC	420 U	380 U	380 U	420 U
4-Nitroaniline	SVOC	1000 U	920 U	920 U	1000 U
4,6-Dinitro-2-methylphenol	SVOC	1000 U	920 U	920 U	1000 U
N-Nitrosodiphenylamine	SVOC	420 U	380 U	380 U	420 U
4-Bromophenyl-phenylether	SVOC	420 UJ	380 UJ	380 UJ	420 U
Hexachlorobenzene	SVOC	420 U	380 U	380 U	420 U
Pentachlorophenol	SVOC	1000 U	920 U	920 U	1000 U
Phenanthrene	SVOC	420 U	380 U	380 U	420 U
Anthracene	SVOC	420 U	380 U	380 U	420 U
Carbazole	SVOC	420 U	380 U	380 U	420 U
Di-n-butylphthalate	SVOC	420 U	380 U	380 U	420 U
Fluoranthene	SVOC	420 U	380 U	380 U	420 U
Pyrene	SVOC	420 U	380 U	380 U	420 U
Butylbenzylphthalate	SVOC	420 U	380 U	380 U	420 U
3,3'-Dichlorobenzidine	SVOC	420 UJ	380 UJ	380 UJ	420 UJ
Benzo(a)anthracene	SVOC	420 U	380 U	380 U	420 U
Chrysene	SVOC	420 U	380 U	380 U	420 U
bis(2-Ethylhexyl)phthalate	SVOC	420 U	380 U	380 U	420 U
Di-n-octylphthalate	SVOC	420 U	380 U	380 U	420 U
Benzo(b)fluoranthene	SVOC	420 U	380 U	380 U	420 U
Benzo(k)fluoranthene	SVOC	420 U	380 U	380 U	420 U
Benzo(a)pyrene	SVOC	420 U	380 U	380 U	420 U
Indeno(1,2,3-cd)pyrene	SVOC	420 U	380 U	380 U	420 U
Dibenz(a,h)anthracene	SVOC	420 U	380 U	380 U	420 U
Benzo(g,h,i)perylene	SVOC	420 U	380 U	380 U	420 U
Associated Method Blank		SBLKS3	SBLKS3	SBLKS3	SBLKS1
Associated Rinse Blank		FB34-941114-S	FB34-941114-S	FB34-941114-S	NA

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	1.5
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	07-Dec-94
Date Extracted		21-Nov-94	21-Nov-94	21-Nov-94	12-Dec-94
Date Analyzed		06-Dec-94	06-Dec-94	06-Dec-94	16-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		25	17	12	8
Parameter	Class				
Phenol	SVOC	440 U	400 U	380 U	360 U
bis(2-Chloroethyl)ether	SVOC	440 U	400 U	380 U	360 U
2-Chlorophenol	SVOC	440 U	400 U	380 U	360 U
1,3-Dichlorobenzene	SVOC	440 U	400 U	380 U	360 U
1,4-Dichlorobenzene	SVOC	440 U	400 U	380 U	360 U
1,2-Dichlorobenzene	SVOC	440 U	400 U	380 U	360 U
2-Methylphenol	SVOC	440 U	400 U	380 U	360 U
2,2'-oxybis(1-Chloropropane)	SVOC	440 U	400 U	380 U	360 U
4-Methylphenol	SVOC	440 U	400 U	380 U	360 U
N-Nitroso-di-n-propylamine	SVOC	440 U	400 U	380 U	360 U
Hexachloroethane	SVOC	440 U	400 U	380 U	360 U
Nitrobenzene	SVOC	440 U	400 U	380 U	360 U
Isophorone	SVOC	440 U	400 U	380 U	360 U
2-Nitrophenol	SVOC	440 U	400 U	380 U	360 U
2,4-Dimethylphenol	SVOC	440 U	400 U	380 U	360 U
bis(2-Chloroethoxy)methane	SVOC	440 U	400 U	380 U	360 U
2,4-Dichlorophenol	SVOC	440 U	400 U	380 U	360 U
1,2,4-Trichlorobenzene	SVOC	440 U	400 U	380 U	360 U
Naphthalene	SVOC	440 U	400 U	380 U	360 U
4-Chloroaniline	SVOC	440 U	400 U	380 U	360 U
Hexachlorobutadiene	SVOC	440 U	400 U	380 U	360 U
4-Chloro-3-methylphenol	SVOC	440 U	400 U	380 U	360 U
2-Methylnaphthalene	SVOC	440 U	400 U	380 U	360 U
Hexachlorocyclopentadiene	SVOC	440 U	400 U	380 U	360 U
2,4,6-Trichlorophenol	SVOC	440 U	400 U	380 U	360 U
2,4,5-Trichlorophenol	SVOC	1100 U	960 U	910 U	870 U
2-Chloronaphthalene	SVOC	440 U	400 U	380 U	360 U
2-Nitroaniline	SVOC	1100 U	960 U	910 U	870 U
Dimethylphthalate	SVOC	440 U	400 U	380 U	360 U
Acenaphthylene	SVOC	440 U	400 U	380 U	360 U
2,6-Dinitrotoluene	SVOC	440 U	400 U	380 U	360 U
3-Nitroaniline	SVOC	1100 UJ	960 U	910 U	870 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1A
Associated Rinse Blank		NA	FB34-941116-S	FB34-941116-S	FB34-941207-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		WB-MW-34-003-5	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		5	0	0	0
Ending Depth (ft.)		7	2	2	1.5
Date Sampled		15-Nov-94	16-Nov-94	16-Nov-94	07-Dec-94
Date Extracted		21-Nov-94	21-Nov-94	21-Nov-94	12-Dec-94
Date Analyzed		06-Dec-94	06-Dec-94	06-Dec-94	16-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		25	17	12	8
Parameter	Class				
Acenaphthene	SVOC	440 U	400 U	380 U	360 U
2,4-Dinitrophenol	SVOC	1100 U	960 U	910 U	870 U
4-Nitrophenol	SVOC	1100 U	960 U	910 U	870 U
Dibenzofuran	SVOC	440 U	400 U	380 U	360 U
2,4-Dinitrotoluene	SVOC	440 U	400 U	380 U	360 U
Diethylphthalate	SVOC	1100	400 U	105 J	360 U
4-Chlorophenyl-phenylether	SVOC	440 U	400 U	380 U	360 U
Fluorene	SVOC	440 U	400 U	380 U	360 U
4-Nitroaniline	SVOC	1100 U	960 U	910 U	870 U
4,6-Dinitro-2-methylphenol	SVOC	1100 U	960 U	910 U	870 U
N-Nitrosodiphenylamine	SVOC	440 U	400 U	380 U	360 U
4-Bromophenyl-phenylether	SVOC	440 U	400 U	380 U	360 U
Hexachlorobenzene	SVOC	440 U	400 U	380 U	360 U
Pentachlorophenol	SVOC	1100 U	960 U	910 U	870 U
Phenanthrene	SVOC	440 U	400 U	380 U	360 U
Anthracene	SVOC	440 U	400 U	380 U	360 U
Carbazole	SVOC	440 U	400 U	380 U	360 U
Di-n-butylphthalate	SVOC	440 U	400 U	380 U	120 J
Fluoranthene	SVOC	440 U	400 U	380 U	360 U
Pyrene	SVOC	440 U	400 U	380 U	360 U
Butylbenzylphthalate	SVOC	440 U	400 U	380 U	360 UJ
3,3'-Dichlorobenzidine	SVOC	440 UJ	400 U	380 U	360 U
Benzo(a)anthracene	SVOC	440 U	400 U	380 U	360 U
Chrysene	SVOC	440 U	400 U	380 U	360 U
bis(2-Ethylhexyl)phthalate	SVOC	440 U	400 U	380 U	360 U
Di-n-octylphthalate	SVOC	440 U	400 U	380 U	360 U
Benzo(b)fluoranthene	SVOC	440 U	400 U	380 U	360 U
Benzo(k)fluoranthene	SVOC	440 U	400 U	380 U	360 U
Benzo(a)pyrene	SVOC	440 U	400 U	380 U	360 U
Indeno(1,2,3-cd)pyrene	SVOC	440 U	400 U	380 U	360 U
Dibenz(a,h)anthracene	SVOC	440 U	400 U	380 U	360 U
Benzo(g,h,i)perylene	SVOC	440 U	400 U	380 U	360 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1A
Associated Rinse Blank		NA	FB34-941116-S	FB34-941116-S	FB34-941207-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-07-0 RE	SB-34-08-0
Beginning Depth (ft.)		0	0	0	0
Ending Depth (ft.)		4	2	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Date Extracted		21-Nov-94	21-Nov-94	21-Nov-94	21-Nov-94
Date Analyzed		06-Dec-94	06-Dec-94	07-Dec-94	06-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		9	22	22	14
Parameter	Class				
Phenol	SVOC	360 U	420 U	420 U	380 U
bis(2-Chloroethyl)ether	SVOC	360 U	420 U	420 U	380 U
2-Chlorophenol	SVOC	360 U	420 U	420 U	380 U
1,3-Dichlorobenzene	SVOC	360 U	420 U	420 U	380 U
1,4-Dichlorobenzene	SVOC	360 U	420 U	420 U	380 U
1,2-Dichlorobenzene	SVOC	360 U	420 U	420 U	380 U
2-Methylphenol	SVOC	360 U	420 U	420 U	380 U
2,2'-oxybis(1-Chloropropane)	SVOC	360 U	420 U	420 U	380 U
4-Methylphenol	SVOC	360 U	420 U	420 U	380 U
N-Nitroso-di-n-propylamine	SVOC	360 U	420 U	420 U	380 U
Hexachloroethane	SVOC	360 U	420 U	420 U	380 U
Nitrobenzene	SVOC	360 U	420 U	420 U	380 U
Isophorone	SVOC	360 U	420 U	420 U	380 U
2-Nitrophenol	SVOC	360 U	420 U	420 U	380 U
2,4-Dimethylphenol	SVOC	360 U	420 U	420 U	380 U
bis(2-Chloroethoxy)methane	SVOC	360 U	420 U	420 U	380 U
2,4-Dichlorophenol	SVOC	360 U	420 U	420 U	380 U
1,2,4-Trichlorobenzene	SVOC	360 U	420 U	420 U	380 U
Naphthalene	SVOC	360 U	420 U	420 U	380 U
4-Chloroaniline	SVOC	360 U	420 U	420 U	380 U
Hexachlorobutadiene	SVOC	360 U	420 U	420 U	380 U
4-Chloro-3-methylphenol	SVOC	360 U	420 U	420 U	380 U
2-Methylnaphthalene	SVOC	360 U	420 U	420 U	380 U
Hexachlorocyclopentadiene	SVOC	360 U	420 U	420 U	380 U
2,4,6-Trichlorophenol	SVOC	360 U	420 U	420 U	380 U
2,4,5-Trichlorophenol	SVOC	880 U	1000 U	1000 U	930 U
2-Chloronaphthalene	SVOC	360 U	420 U	420 U	380 U
2-Nitroaniline	SVOC	880 U	1000 U	1000 U	930 U
Dimethylphthalate	SVOC	360 U	420 U	420 U	380 U
Acenaphthylene	SVOC	360 U	420 U	420 U	380 U
2,6-Dinitrotoluene	SVOC	360 U	420 U	420 U	380 U
3-Nitroaniline	SVOC	880 U	1000 U	1000 U	930 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1
Associated Rinse Blank		FB34-941116-S	FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
SOIL (SEMIVOLATILES)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-07-0 RE	SB-34-08-0
Beginning Depth (ft.)		0	0	0	0
Ending Depth (ft.)		4	2	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Date Extracted		21-Nov-94	21-Nov-94	21-Nov-94	21-Nov-94
Date Analyzed		06-Dec-94	06-Dec-94	07-Dec-94	06-Dec-94
Units		UG/KG	UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1	1
% Moisture		9	22	22	14
Parameter	Class				
Acenaphthene	SVOC	360 U	420 U	420 U	380 U
2,4-Dinitrophenol	SVOC	880 U	1000 U	1000 U	930 U
4-Nitrophenol	SVOC	880 U	1000 U	1000 U	930 U
Dibenzofuran	SVOC	360 U	420 U	420 U	380 U
2,4-Dinitrotoluene	SVOC	360 U	420 U	420 U	380 U
Diethylphthalate	SVOC	360 U	420 U	420 U	380 U
4-Chlorophenyl-phenylether	SVOC	360 U	420 U	420 U	380 U
Fluorene	SVOC	360 U	420 U	420 U	380 U
4-Nitroaniline	SVOC	880 U	1000 U	1000 U	930 U
4,6-Dinitro-2-methylphenol	SVOC	880 U	1000 U	1000 U	930 U
N-Nitrosodiphenylamine	SVOC	360 U	420 U	420 U	380 U
4-Bromophenyl-phenylether	SVOC	360 U	420 U	420 U	380 U
Hexachlorobenzene	SVOC	360 U	420 U	420 U	380 U
Pentachlorophenol	SVOC	880 U	1000 U	1000 U	930 U
Phenanthrene	SVOC	360 U	420 U	420 U	380 U
Anthracene	SVOC	360 U	420 U	420 U	380 U
Carbazole	SVOC	360 U	420 U	420 U	380 U
Di-n-butylphthalate	SVOC	360 U	420 U	420 U	380 U
Fluoranthene	SVOC	360 U	420 U	420 U	380 U
Pyrene	SVOC	360 U	420 U	420 UJ	380 U
Butylbenzylphthalate	SVOC	360 U	420 U	420 UJ	380 U
3,3'-Dichlorobenzidine	SVOC	360 U	420 U	420 UJ	380 U
Benzo(a)anthracene	SVOC	360 U	420 U	420 UJ	380 U
Chrysene	SVOC	360 U	420 U	420 UJ	380 U
bis(2-Ethylhexyl)phthalate	SVOC	360 U	420 U	420 U	380 U
Di-n-octylphthalate	SVOC	360 U	420 UJ	420 U	380 U
Benzo(b)fluoranthene	SVOC	360 U	420 UJ	420 U	380 U
Benzo(k)fluoranthene	SVOC	360 U	420 UJ	420 U	380 U
Benzo(a)pyrene	SVOC	360 U	420 UJ	420 U	380 U
Indeno(1,2,3-cd)pyrene	SVOC	360 U	420 UJ	420 U	380 U
Dibenz(a,h)anthracene	SVOC	360 U	420 UJ	420 U	380 U
Benzo(g,h,i)perylene	SVOC	360 U	420 UJ	420 U	380 U
Associated Method Blank		SBLKS1	SBLKS1	SBLKS1	SBLKS1
Associated Rinse Blank		FB34-941116-S	FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		WB-MW-34-003-0	WB-MW-34-003-5	WB-MW-34-001-0	WB-MW-34-001-0 DUP
Beginning Depth (ft.)		0	5	0	0
Ending Depth (ft.)		2	7	2	2
Date Sampled		15-Nov-94	15-Nov-94	14-Nov-94	14-Nov-94
Units		MG/KG	MG/KG	MG/KG	MG/KG
% Moisture		22	22	22	14
Parameter	Class				
Aluminum	METAL	2350	26300	7170	7910
Antimony	METAL	6.5 U	6.7 U	6.5 U	5.8 U
Arsenic	METAL	1.3 []	0.96 U	3.4	3.2
Barium	METAL	12.6 []	282	53.5	64.5
Beryllium	METAL	0.12 []	1.2 []	0.37 []	0.39 []
Cadmium	METAL	0.64 U	1.5	2.0	1.6
Calcium	METAL	2810	7450	3630	2770
Chromium	METAL	3.8	55.7	19.5	15.6
Cobalt	METAL	1.8 []	27.4	8.7 []	9 []
Copper	METAL	1.4 []	41.8	16.8	11.6
Iron	METAL	4460	40800	16700	14200
Lead	METAL	4.7	7	6.8	5.6
Magnesium	METAL	1220 []	14400	2560	2830
Manganese	METAL	57	680	188	218
Mercury	METAL	0.13 U	0.13 U	0.13 U	0.12 U
Nickel	METAL	3.4 []	50.9	17.1	14.3
Potassium	METAL	333 []	6830	1370	1510
Selenium	METAL	1.1 UJ	1.7 J	0.82 [] J	0.46 U
Silver	METAL	0.77 U	0.8 U	0.77 UJ	0.69 UJ
Sodium	METAL	225 []	940 []	436 []	302 []
Thallium	METAL	0.51 U	0.53 U	0.52 U	0.46 U
Vanadium	METAL	6.4 []	69.3	21.9	23.8
Zinc	METAL	16.6	110	52.7 R	32.9 R
Associated Rinse Blank		NA	NA	FB34-941114-S	FB34-941114-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		WB-MW-34-001-4	SB-34-02-0	SB-34-04-0	SB-34-05-0
Beginning Depth (ft.)		4	0	0	0
Ending Depth (ft.)		6	2	2	4
Date Sampled		14-Nov-94	16-Nov-94	16-Nov-94	16-Nov-94
Units		MG/KG	MG/KG	MG/KG	MG/KG
% Moisture		13	17	12	7
Parameter	Class				
Aluminum	METAL	13000	5110	3020	2110
Antimony	METAL	5.8 U	6.1 UJ	5.8 UJ	5.4 UJ
Arsenic	METAL	2.9	0.87 U	0.82 U	1.1 [illegible]
Barium	METAL	123	32.3 [illegible]	18.8 [illegible]	13.7 [illegible]
Beryllium	METAL	0.64 [illegible]	0.22 [illegible]	0.05 U	0.11 [illegible]
Cadmium	METAL	1.8 J	0.6 U	0.57 U	0.54 U
Calcium	METAL	4420	879 [illegible]	1000 [illegible]	5080
Chromium	METAL	25.6	7.3 J	5.7 J	2.9 J
Cobalt	METAL	17.2	3.4 [illegible]	2.4 [illegible]	2.4 [illegible]
Copper	METAL	22.7	2.8 [illegible]	0.96 U	2.9 [illegible]
Iron	METAL	24800	7770	4480	5650
Lead	METAL	5.7	5.5 J	1.6	3.4
Magnesium	METAL	6490	1250	886 [illegible]	1560
Manganese	METAL	456	59.2 J	36.2 J	95.6 J
Mercury	METAL	0.12 U	0.12 U	0.11 U	0.11 U
Nickel	METAL	27.6	7.1 [illegible]	3.5 [illegible]	3.9 [illegible]
Potassium	METAL	3120	574 [illegible]	418 [illegible]	364 [illegible]
Selenium	METAL	0.46 U	1.1 UJ	1 UJ	0.95 UJ
Silver	METAL	0.69 UJ	0.72 U	0.68 U	0.65 U
Sodium	METAL	491 [illegible]	196 [illegible]	178 [illegible]	167 [illegible]
Thallium	METAL	0.46 U	0.48 U	0.46 U	0.43 U
Vanadium	METAL	42.1	13.8	6.7 [illegible]	7.4 [illegible]
Zinc	METAL	58 R	22.2	40.8	20.2
Associated Rinse Blank		FB34-941114-S	FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-08-0
Beginning Depth (ft.)		0	0	0
Ending Depth (ft.)		4	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94
Units		MG/KG	MG/KG	MG/KG
% Moisture		9	22	14
Parameter	Class			
Aluminum	METAL	2590	9510	2840
Antimony	METAL	5.6 UJ	6.5 UJ	5.9 UJ
Arsenic	METAL	0.79 U	0.92 U	0.83 U
Barium	METAL	12 []	79.3	19.3 []
Beryllium	METAL	0.12 []	0.36 []	0.05 []
Cadmium	METAL	0.55 U	0.64 U	0.58 U
Calcium	METAL	1130	5890	729 []
Chromium	METAL	5 J	19.1 J	4.2 J
Cobalt	METAL	2.8 []	10.1 []	2.2 []
Copper	METAL	1.7 []	13.2	0.97 U
Iron	METAL	8530 []	15700	4510
Lead	METAL	2.4	4.9 J	3.9
Magnesium	METAL	727 []	4450	703 []
Manganese	METAL	31.2 J	310 J	35.2 J
Mercury	METAL	0.11 U	0.13 U	0.12 U
Nickel	METAL	3.3 []	17.2	2.3 []
Potassium	METAL	265 []	1800	284 []
Selenium	METAL	0.97 UJ	1.3 J	1 UJ
Silver	METAL	0.66 U	0.77 U	0.69 U
Sodium	METAL	157 []	280 []	186 []
Thallium	METAL	0.44 U	0.51 U	0.46 U
Vanadium	METAL	12	22.5	7.3 []
Zinc	METAL	26.2	64.3	36.6
Associated Rinse Blank		FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
RINSE BLANK (VOLATILES)

Sample I.D.		FB34-941114-S	FB34-941116-S
Date Sampled		14-Nov-94	16-Nov-94
Date Analyzed		17-Nov-94	19-Nov-94
Units		UG/L	UG/L
Dilution Factor		1	1
Parameter	Class		
Chloromethane	VOC	10 U	10 U
Bromomethane	VOC	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U
Chloroethane	VOC	10 U	10 U
Methylene Chloride	VOC	10 U	10 U
Acetone	VOC	10 U	10 UJ
Carbon Disulfide	VOC	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U
Chloroform	VOC	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U
2-Butanone	VOC	10 UJ	10 UJ
1,1,1-Trichloroethane	VOC	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U
Trichloroethene	VOC	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U
Benzene	VOC	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U
Bromoform	VOC	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 UJ	10 U
2-Hexanone	VOC	10 UJ	10 UJ
Tetrachloroethene	VOC	1 J	10 U
1,1,2,2-Tetrachloroethane	VOC	10 UJ	10 U
Toluene	VOC	10 U	10 U
Chlorobenzene	VOC	10 U	10 U
Ethylbenzene	VOC	10 U	10 U
Styrene	VOC	10 U	10 U
Xylene (total)	VOC	10 U	10 U
Associated Method Blank		VBLKW2	VBLKW1
Associated Trip Blank		NA	NA
Associated Rinse Blank		NA	NA

TABLE C-1

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SITE SS-034
SOIL (METALS)

Sample I.D.		SB-34-06-0	SB-34-07-0	SB-34-08-0
Beginning Depth (ft.)		0	0	0
Ending Depth (ft.)		4	2	2
Date Sampled		16-Nov-94	16-Nov-94	16-Nov-94
Units		MG/KG	MG/KG	MG/KG
% Moisture		9	22	14
Parameter	Class			
Aluminum	METAL	2590	9510	2840
Antimony	METAL	5.6 UJ	6.5 UJ	5.9 UJ
Arsenic	METAL	0.79 U	0.92 U	0.83 U
Barium	METAL	12 []	79.3	19.3 []
Beryllium	METAL	0.12 []	0.36 []	0.05 []
Cadmium	METAL	0.55 U	0.64 U	0.58 U
Calcium	METAL	1130	5890	729 []
Chromium	METAL	5 J	19.1 J	4.2 J
Cobalt	METAL	2.8 []	10.1 []	2.2 []
Copper	METAL	1.7 []	13.2	0.97 U
Iron	METAL	8530 []	15700	4510
Lead	METAL	2.4	4.9 J	3.9
Magnesium	METAL	727 []	4450	703 []
Manganese	METAL	31.2 J	310 J	35.2 J
Mercury	METAL	0.11 U	0.13 U	0.12 U
Nickel	METAL	3.3 []	17.2	2.3 []
Potassium	METAL	265 []	1800	284 []
Selenium	METAL	0.97 UJ	1.3 J	1 UJ
Silver	METAL	0.66 U	0.77 U	0.69 U
Sodium	METAL	157 []	280 []	186 []
Thallium	METAL	0.44 U	0.51 U	0.46 U
Vanadium	METAL	12	22.5	7.3 []
Zinc	METAL	26.2	64.3	36.6
Associated Rinse Blank		FB34-941116-S	FB34-941116-S	FB34-941116-S

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
RINSE BLANK (VOLATILES)

Sample I.D.		FB34-941114-S	FB34-941116-S
Date Sampled		14-Nov-94	16-Nov-94
Date Analyzed		17-Nov-94	19-Nov-94
Units		UG/L	UG/L
Dilution Factor		1	1
Parameter	Class		
Chloromethane	VOC	10 U	10 U
Bromomethane	VOC	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U
Chloroethane	VOC	10 U	10 U
Methylene Chloride	VOC	10 U	10 U
Acetone	VOC	10 U	10 UJ
Carbon Disulfide	VOC	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U
Chloroform	VOC	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U
2-Butanone	VOC	10 UJ	10 UJ
1,1,1-Trichloroethane	VOC	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U
Trichloroethene	VOC	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U
Benzene	VOC	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U
Bromoform	VOC	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 UJ	10 U
2-Hexanone	VOC	10 UJ	10 UJ
Tetrachloroethene	VOC	1 J	10 U
1,1,2,2-Tetrachloroethane	VOC	10 UJ	10 U
Toluene	VOC	10 U	10 U
Chlorobenzene	VOC	10 U	10 U
Ethylbenzene	VOC	10 U	10 U
Styrene	VOC	10 U	10 U
Xylene (total)	VOC	10 U	10 U
Associated Method Blank		VBLKW2	VBLKW1
Associated Trip Blank		NA	NA
Associated Rinse Blank		NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
RINSE BLANK (SEMIVOLATILES)

Sample I.D.		FB34-941114-S	FB34-941116-S	FB34-941207-S
Date Sampled		14-Nov-94	16-Nov-94	07-Dec-94
Date Extracted		17-Nov-94	20-Nov-94	12-Dec-94
Date Analyzed		29-Nov-94	30-Nov-94	13-Dec-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Phenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethyl)ether	SVOC	10 U	10 U	10 U
2-Chlorophenol	SVOC	10 U	10 U	10 U
1,3-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,4-Dichlorobenzene	SVOC	10 U	10 U	10 U
1,2-Dichlorobenzene	SVOC	10 U	10 U	10 U
2-Methylphenol	SVOC	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	SVOC	10 U	10 U	10 U
4-Methylphenol	SVOC	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	SVOC	10 U	10 U	10 U
Hexachloroethane	SVOC	10 U	10 U	10 U
Nitrobenzene	SVOC	10 U	10 U	10 U
Isophorone	SVOC	10 U	10 U	10 U
2-Nitrophenol	SVOC	10 U	10 U	10 U
2,4-Dimethylphenol	SVOC	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	SVOC	10 U	10 U	10 U
2,4-Dichlorophenol	SVOC	10 U	10 U	10 U
1,2,4-Trichlorobenzene	SVOC	10 U	10 U	10 U
Naphthalene	SVOC	10 U	10 U	10 U
4-Chloroaniline	SVOC	10 U	10 U	10 U
Hexachlorobutadiene	SVOC	10 U	10 U	10 U
4-Chloro-3-methylphenol	SVOC	10 U	10 U	10 U
2-Methylnaphthalene	SVOC	10 U	10 U	10 U
Hexachlorocyclopentadiene	SVOC	10 U	10 U	10 U
2,4,6-Trichlorophenol	SVOC	10 U	10 U	10 U
2,4,5-Trichlorophenol	SVOC	25 U	25 U	25 U
2-Chloronaphthalene	SVOC	10 U	10 U	10 U
2-Nitroaniline	SVOC	25 U	25 U	25 U
Dimethylphthalate	SVOC	10 U	10 U	10 U
Acenaphthylene	SVOC	10 U	10 U	10 U
2,6-Dinitrotoluene	SVOC	10 U	10 U	10 U
3-Nitroaniline	SVOC	25 U	25 U	25 UJ
Associated Method Blank		SBLKW3	SBLKW1	SBLKW2
Associated Rinse Blank		NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
RINSE BLANK (SEMIVOLATILES)

Sample I.D.		FB34-941114-S	FB34-941116-S	FB34-941207-S
Date Sampled		14-Nov-94	16-Nov-94	07-Dec-94
Date Extracted		17-Nov-94	20-Nov-94	12-Dec-94
Date Analyzed		29-Nov-94	30-Nov-94	13-Dec-94
Units		UG/L	UG/L	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Acenaphthene	SVOC	10 U	10 U	10 U
2,4-Dinitrophenol	SVOC	25 U	25 U	25 UJ
4-Nitrophenol	SVOC	25 U	25 U	25 UJ
Dibenzofuran	SVOC	10 U	10 U	10 U
2,4-Dinitrotoluene	SVOC	10 U	10 U	10 U
Diethylphthalate	SVOC	10 U	10 U	10 U
4-Chlorophenyl-phenylether	SVOC	10 U	10 U	10 U
Fluorene	SVOC	10 U	10 U	10 U
4-Nitroaniline	SVOC	25 U	25 U	25 UJ
4,6-Dinitro-2-methylphenol	SVOC	25 U	25 U	25 U
N-Nitrosodiphenylamine	SVOC	10 U	10 U	10 U
4-Bromophenyl-phenylether	SVOC	10 U	10 U	10 U
Hexachlorobenzene	SVOC	10 U	10 U	10 U
Pentachlorophenol	SVOC	25 U	25 U	25 U
Phenanthrene	SVOC	10 U	10 U	10 U
Anthracene	SVOC	10 U	10 U	10 U
Carbazole	SVOC	10 U	10 U	10 UJ
Di-n-butylphthalate	SVOC	10 U	10 U	10 U
Fluoranthene	SVOC	10 U	10 U	10 U
Pyrene	SVOC	10 U	10 U	10 U
Butylbenzylphthalate	SVOC	10 U	10 U	10 U
3,3'-Dichlorobenzidine	SVOC	10 U	10 U	10 UJ
Benzo(a)anthracene	SVOC	10 U	10 U	10 U
Chrysene	SVOC	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	SVOC	1 J	10 U	10 UJ
Di-n-octylphthalate	SVOC	10 U	10 U	10 U
Benzo(b)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(k)fluoranthene	SVOC	10 U	10 U	10 U
Benzo(a)pyrene	SVOC	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	SVOC	10 U	10 U	10 U
Dibenz(a,h)anthracene	SVOC	10 U	10 U	10 U
Benzo(g,h,i)perylene	SVOC	10 U	10 U	10 U
Associated Method Blank		SBLKW3	SBLKW1	SBLKW2
Associated Rinse Blank		NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SITE SS-034
RINSE BLANK (METALS)

Sample I.D.		FB34-941114-S	FB34-941116-S
Date Sampled		14-Nov-94	16-Nov-94
Units		UG/L	UG/L
Parameter	Class		
Aluminum	METAL	766	35.2 U
Antimony	METAL	25.3 U	25.3 U
Arsenic	METAL	2 U	2 U
Barium	METAL	8.6 []	5.1 U
Beryllium	METAL	0.2 U	0.2 U
Cadmium	METAL	2.5 U	2.5 U
Calcium	METAL	376 []	150 []
Chromium	METAL	7.1 []	4.8 U
Cobalt	METAL	4.1 U	4.1 U
Copper	METAL	4.2 U	4.2 U
Iron	METAL	885	141
Lead	METAL	1 U	3.4
Magnesium	METAL	338 []	116 U
Manganese	METAL	16.5	30.1
Mercury	METAL	0.2 U	0.2 UJ
Nickel	METAL	8.4 U	8.4 U
Potassium	METAL	353 []	246 U
Selenium	METAL	2 U	10 UJ
Silver	METAL	3 U	3 UJ
Sodium	METAL	396 U	1780 []
Thallium	METAL	2 U	2.8 U
Vanadium	METAL	3.7 []	3.6 U
Zinc	METAL	85.1	15.6 []
Associated Rinse Blank		NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
METHOD BLANK (VOLATILES)

Sample I.D.		VBLKW2	VBLKS3	VBLKW1	VBLKS1
Date Analyzed		17-Nov-94	16-Nov-94	18-Nov-94	17-Nov-94
Units		UG/L	UG/KG	UG/L	UG/KG
Dilution Factor		1	1	1	1
Parameter	Class				
Chloromethane	VOC	10 U	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U	10 U
Acetone	VOC	10 U	10 UJ	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	10 U	10 U
2-Butanone	VOC	10 UJ	10 UJ	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 UJ	10 U	10 U	10 U
2-Hexanone	VOC	10 UJ	10 U	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 UJ	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U	10 U
Associated Method Blank		NA	NA	NA	NA
Associated Trip Blank		NA	NA	NA	NA
Associated Rinse Blank		NA	NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
METHOD BLANK (VOLATILES)

Sample I.D.		VBLKS2	VBLKS1A	VBLKS2A
Date Analyzed		19-Nov-94	19-Nov-94	21-Nov-94
Units		UG/KG	UG/KG	UG/KG
Dilution Factor		1	1	1
Parameter	Class			
Chloromethane	VOC	10 U	10 U	10 U
Bromomethane	VOC	10 U	10 U	10 U
Vinyl Chloride	VOC	10 U	10 U	10 U
Chloroethane	VOC	10 U	10 U	10 U
Methylene Chloride	VOC	10 U	10 U	10 U
Acetone	VOC	10 U	10 U	10 U
Carbon Disulfide	VOC	10 U	10 U	10 U
1,1-Dichloroethene	VOC	10 U	10 U	10 U
1,1-Dichloroethane	VOC	10 U	10 U	10 U
1,2-Dichloroethene (total)	VOC	10 U	10 U	10 U
Chloroform	VOC	10 U	10 U	10 U
1,2-Dichloroethane	VOC	10 U	10 U	10 U
2-Butanone	VOC	10 U	10 U	10 U
1,1,1-Trichloroethane	VOC	10 U	10 U	10 U
Carbon Tetrachloride	VOC	10 U	10 U	10 U
Bromodichloromethane	VOC	10 U	10 U	10 U
1,2-Dichloropropane	VOC	10 U	10 U	10 U
cis-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Trichloroethene	VOC	10 U	10 U	10 U
Dibromochloromethane	VOC	10 U	10 U	10 U
1,1,2-Trichloroethane	VOC	10 U	10 U	10 U
Benzene	VOC	10 U	10 U	10 U
trans-1,3-Dichloropropene	VOC	10 U	10 U	10 U
Bromoform	VOC	10 U	10 U	10 U
4-Methyl-2-Pentanone	VOC	10 U	10 U	10 U
2-Hexanone	VOC	10 U	10 U	10 U
Tetrachloroethene	VOC	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	VOC	10 U	10 U	10 U
Toluene	VOC	10 U	10 U	10 U
Chlorobenzene	VOC	10 U	10 U	10 U
Ethylbenzene	VOC	10 U	10 U	10 U
Styrene	VOC	10 U	10 U	10 U
Xylene (total)	VOC	10 U	10 U	10 U
Associated Method Blank		NA	NA	NA
Associated Trip Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
METHOD BLANK (SEMIVOLATILES)

Sample I.D.		SBLKS3	SBLKW3	SBLKS1
Date Extracted		16-Nov-94	17-Nov-94	21-Nov-94
Date Analyzed		28-Nov-94	29-Nov-94	05-Dec-94
Units		UG/KG	UG/L	UG/KG
Dilution Factor		1	1	1
Parameter	Class			
Phenol	SVOC	330 U	10 U	330 U
bis(2-Chloroethyl)ether	SVOC	330 U	10 U	330 U
2-Chlorophenol	SVOC	330 U	10 U	330 U
1,3-Dichlorobenzene	SVOC	330 U	10 U	330 U
1,4-Dichlorobenzene	SVOC	330 U	10 U	330 U
1,2-Dichlorobenzene	SVOC	330 U	10 U	330 U
2-Methylphenol	SVOC	330 U	10 U	330 U
2,2'-oxybis(1-Chloropropane)	SVOC	330 U	10 U	330 U
4-Methylphenol	SVOC	330 U	10 U	330 U
N-Nitroso-di-n-propylamine	SVOC	330 U	10 U	330 U
Hexachloroethane	SVOC	330 U	10 U	330 U
Nitrobenzene	SVOC	330 U	10 U	330 U
Isophorone	SVOC	330 U	10 U	330 U
2-Nitrophenol	SVOC	330 U	10 U	330 U
2,4-Dimethylphenol	SVOC	330 U	10 U	330 U
bis(2-Chloroethoxy)methane	SVOC	330 U	10 U	330 U
2,4-Dichlorophenol	SVOC	330 U	10 U	330 U
1,2,4-Trichlorobenzene	SVOC	330 U	10 U	330 U
Naphthalene	SVOC	330 U	10 U	330 U
4-Chloroaniline	SVOC	330 U	10 U	330 U
Hexachlorobutadiene	SVOC	330 U	10 U	330 U
4-Chloro-3-methylphenol	SVOC	330 U	10 U	330 U
2-Methylnaphthalene	SVOC	330 U	10 U	330 U
Hexachlorocyclopentadiene	SVOC	330 U	10 U	330 U
2,4,6-Trichlorophenol	SVOC	330 U	10 U	330 U
2,4,5-Trichlorophenol	SVOC	800 U	25 U	800 U
2-Chloronaphthalene	SVOC	330 U	10 U	330 U
2-Nitroaniline	SVOC	800 U	25 U	800 U
Dimethylphthalate	SVOC	330 U	10 U	330 U
Acenaphthylene	SVOC	330 U	10 U	330 U
2,6-Dinitrotoluene	SVOC	330 U	10 U	330 U
3-Nitroaniline	SVOC	800 U	25 U	800 UJ
Associated Method Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
METHOD BLANK (SEMIVOLATILES)

Sample I.D.		SBLKS3	SBLKW3	SBLKS1
Date Extracted		16-Nov-94	17-Nov-94	21-Nov-94
Date Analyzed		28-Nov-94	29-Nov-94	05-Dec-94
Units		UG/KG	UG/L	UG/KG
Dilution Factor		1	1	1
Parameter	Class			
Acenaphthene	SVOC	330 U	10 U	330 U
2,4-Dinitrophenol	SVOC	800 U	25 U	800 U
4-Nitrophenol	SVOC	800 U	25 U	800 U
Dibenzofuran	SVOC	330 U	10 U	330 U
2,4-Dinitrotoluene	SVOC	330 U	10 U	330 U
Diethylphthalate	SVOC	970	10 U	330 U
4-Chlorophenyl-phenylether	SVOC	330 U	10 U	330 U
Fluorene	SVOC	330 U	10 U	330 U
4-Nitroaniline	SVOC	800 U	25 U	800 U
4,6-Dinitro-2-methylphenol	SVOC	800 U	25 U	800 U
N-Nitrosodiphenylamine	SVOC	330 U	10 U	330 U
4-Bromophenyl-phenylether	SVOC	330 U	10 U	330 U
Hexachlorobenzene	SVOC	330 U	10 U	330 U
Pentachlorophenol	SVOC	800 U	25 U	800 U
Phenanthrene	SVOC	330 U	10 U	330 U
Anthracene	SVOC	330 U	10 U	330 U
Carbazole	SVOC	330 U	10 U	330 U
Di-n-butylphthalate	SVOC	330 U	10 U	330 U
Fluoranthene	SVOC	330 U	10 U	330 U
Pyrene	SVOC	330 U	10 U	330 U
Butylbenzylphthalate	SVOC	330 U	10 U	330 U
3,3'-Dichlorobenzidine	SVOC	330 U	10 U	330 UJ
Benzo(a)anthracene	SVOC	330 U	10 U	330 U
Chrysene	SVOC	330 U	10 U	330 U
bis(2-Ethylhexyl)phthalate	SVOC	330 U	10 U	330 U
Di-n-octylphthalate	SVOC	330 U	10 U	330 U
Benzo(b)fluoranthene	SVOC	330 U	10 U	330 U
Benzo(k)fluoranthene	SVOC	330 U	10 U	330 U
Benzo(a)pyrene	SVOC	330 U	10 U	330 U
Indeno(1,2,3-cd)pyrene	SVOC	330 U	10 U	330 U
Dibenz(a,h)anthracene	SVOC	330 U	10 U	330 U
Benzo(g,h,i)perylene	SVOC	330 U	10 U	330 U
Associated Method Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

TABLE C-2

VALIDATION SUMMARY TABLE
PLATTSBURGH AIR FORCE BASE SS-034
METHOD BLANK (SEMIVOLATILES)

Sample I.D.		SBLKW1	SBLKS1A	SBLKW2
Date Extracted		20-Nov-94	12-Dec-94	12-Dec-94
Date Analyzed		30-Nov-94	15-Dec-94	13-Dec-94
Units		UG/L	UG/KG	UG/L
Dilution Factor		1	1	1
Parameter	Class			
Phenol	SVOC	10 U	330 U	10 U
bis(2-Chloroethyl)ether	SVOC	10 U	330 U	10 U
2-Chlorophenol	SVOC	10 U	330 U	10 U
1,3-Dichlorobenzene	SVOC	10 U	330 U	10 U
1,4-Dichlorobenzene	SVOC	10 U	330 U	10 U
1,2-Dichlorobenzene	SVOC	10 U	330 U	10 U
2-Methylphenol	SVOC	10 U	330 U	10 U
2,2'-oxybis(1-Chloropropane)	SVOC	10 U	330 U	10 U
4-Methylphenol	SVOC	10 U	330 U	10 U
N-Nitroso-di-n-propylamine	SVOC	10 U	330 U	10 U
Hexachloroethane	SVOC	10 U	330 U	10 U
Nitrobenzene	SVOC	10 U	330 U	10 U
Isophorone	SVOC	10 U	330 U	10 U
2-Nitrophenol	SVOC	10 U	330 U	10 U
2,4-Dimethylphenol	SVOC	10 U	330 U	10 U
bis(2-Chloroethoxy)methane	SVOC	10 U	330 U	10 U
2,4-Dichlorophenol	SVOC	10 U	330 U	10 U
1,2,4-Trichlorobenzene	SVOC	10 U	330 U	10 U
Naphthalene	SVOC	10 U	330 U	10 U
4-Chloroaniline	SVOC	10 U	330 U	10 U
Hexachlorobutadiene	SVOC	10 U	330 U	10 U
4-Chloro-3-methylphenol	SVOC	10 U	330 U	10 U
2-Methylnaphthalene	SVOC	10 U	330 U	10 U
Hexachlorocyclopentadiene	SVOC	10 U	330 U	10 U
2,4,6-Trichlorophenol	SVOC	10 U	330 U	10 U
2,4,5-Trichlorophenol	SVOC	25 U	800 U	25 U
2-Chloronaphthalene	SVOC	10 U	330 U	10 U
2-Nitroaniline	SVOC	25 U	800 U	25 U
Dimethylphthalate	SVOC	10 U	330 U	10 U
Acenaphthylene	SVOC	10 U	330 U	10 U
2,6-Dinitrotoluene	SVOC	10 U	330 U	10 U
3-Nitroaniline	SVOC	25 U	800 U	25 UJ
Associated Method Blank		NA	NA	NA
Associated Rinse Blank		NA	NA	NA

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17730

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) SOIL Lab Sample ID: 17730

Sample wt/vol: 5.2 (g/mL) G Lab File ID: C9695

Level: (low/med) LOW Date Received: 11/16/94

% Moisture: not dec. 25 Date Analyzed: 11/18/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

URS SAMPLE NO.

17505

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17505

Sample wt/vol: 5.2 (g/mL) G Lab File ID: C9662

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: not dec. 22 Date Analyzed: 11/16/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

17506

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17506

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C9663

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: not dec. 13 Date Analyzed: 11/17/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17507

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17507

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C9664

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: not dec. 13 Date Analyzed: 11/17/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17817

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17817

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C9724

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 17 Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17818

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17818

Sample wt/vol: 5.2 (g/mL) G Lab File ID: C9725

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 12 Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17819

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17819

Sample wt/vol: 4.8 (g/mL) G Lab File ID: C9726

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 7 Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17820

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17820

Sample wt/vol: 4.9 (g/mL) G Lab File ID: C9727

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 9 Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

URS SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

17821

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17821

Sample wt/vol: 5.1 (g/mL) G Lab File ID: C9728

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 22 Date Analyzed: 11/19/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17822

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17822

Sample wt/vol: 5.1 (g/mL) G Lab File ID: C9748

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: not dec. 14 Date Analyzed: 11/21/94

GC Column: VOCOL ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		TERPENE ISOMER	22.46	13	J

1F

URS SAMPLE NO.

17505

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17505

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4480

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: 22 decanted: (Y/N) N Date Extracted: 11/16/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 11/28/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN HYDROCARBON	5.94	180	J
2.	12-34-22	Aldol Condensation Product	6.80	8900	ABJN
3.		UNKNOWN	7.45	100	J
4.		UNKNOWN	8.24	1300	BJ
5.		UNKNOWN	8.50	95	J
6.		UNKNOWN	9.05	1300	BJ
7.		UNKNOWN	10.15	410	J
8.		UNKNOWN	10.64	390	J
9.		UNKNOWN OXY. HYDROCARBON	11.23	250	J
10.		UNKNOWN	14.39	86	J
11.		UNKNOWN CARBOXYLIC ACID	26.63	320	BJ
12.		UNKNOWN	28.80	140	J
13.		UNKNOWN CARBOXYLIC ACID	29.09	280	BJ
14.		UNKNOWN HYDROCARBON	32.86	270	J
15.		UNKNOWN OXY. HYDROCARBON	36.11	330	J
16.		UNKNOWN	37.92	200	J
17.		UNKNOWN HYDROCARBON	38.46	270	J
18.		UNKNOWN	38.65	220	J
19.		UNKNOWN	39.93	140	J
20.		UNKNOWN OXY. HYDROCARBON	40.72	770	J
21.		UNKNOWN	43.85	120	J

1F

URS SAMPLE NO.

17506

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17506

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4481

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: 13 decanted: (Y/N) N Date Extracted: 11/16/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 11/28/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 21 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.53	630	J
2.		UNKNOWN	5.91	2300	J
3.	12-34-22	Aldol Condensation Product	6.62	39000	ABJN
4.		UNKNOWN	8.17	770	J
5.		UNKNOWN	9.00	880	BJ
6.		UNKNOWN	9.20	150	J
7.		UNKNOWN	10.12	360	J
8.		UNKNOWN	10.61	330	J
9.		UNKNOWN OXY. HYDROCARBON	11.21	260	J
10.		UNKNOWN	11.46	210	BJ
11.		UNKNOWN	13.41	3100	J
12.		UNKNOWN	14.94	160	J
13.		UNKNOWN	16.61	2100	J
14.		UNKNOWN	17.99	220	J
15.		UNKNOWN	19.43	110	J
16.		UNKNOWN	20.65	300	J
17.		UNKNOWN	23.03	380	J
18.		UNKNOWN	25.17	220	J
19.		UNKNOWN	26.20	210	J
20.		UNKNOWN	27.14	150	J
21.		UNKNOWN	28.00	160	J

1F

URS SAMPLE NO.

17507

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 515 SAS No.: SDG No.: 17284

Matrix: (soil/water) SOIL Lab Sample ID: 17507

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4482

Level: (low/med) LOW Date Received: 11/15/94

% Moisture: 13 decanted: (Y/N) N Date Extracted: 11/16/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 11/28/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.52	660	J
2.		UNKNOWN	5.86	2100	J
3.	12-34-22	Aldol Condensation Product	6.59	38000	ABJN
4.		UNKNOWN	8.16	750	J
5.		UNKNOWN	8.97	570	J
6.		UNKNOWN	9.20	140	J
7.		UNKNOWN	10.09	3600	J
8.		UNKNOWN	10.59	150	J
9.		UNKNOWN	13.41	2700	J
10.		UNKNOWN	14.95	160	J
11.		UNKNOWN	16.61	1900	J
12.		UNKNOWN	17.99	220	J
13.		UNKNOWN	19.43	90	J
14.		UNKNOWN	20.65	310	J
15.		UNKNOWN	23.03	420	J
16.		UNKNOWN	25.17	240	J
17.		UNKNOWN	26.20	200	J
18.		UNKNOWN	27.13	190	J
19.		UNKNOWN	28.00	150	J
20.		UNKNOWN	29.64	220	J
21.		UNKNOWN	31.14	200	J

1F

URS SAMPLE NO.

17729

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) SOIL Lab Sample ID: 17729

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4631

Level: (low/med) LOW Date Received: 11/16/94

% Moisture: 22 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/05/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 21 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	12-34-22	Aldol Condensation Product	6.25	40000	ABJN
2.		UNKNOWN	8.22	550	J
3.		UNKNOWN	10.30	170	J
4.		UNKNOWN	11.15	610	J
5.		UNKNOWN	11.53	540	J
6.	65-85-0	Benzoic Acid	11.82	220	JN
7.		UNKNOWN	13.08	200	J
8.		UNKNOWN	14.23	180	J
9.		UNKNOWN CARBOXYLIC ACID	26.25	410	J
10.		UNKNOWN CARBOXYLIC ACID	28.43	410	J
11.		UNKNOWN CARBOXYLIC ACID	28.72	330	J
12.		UNKNOWN OXY. HYDROCARBON	32.39	1100	J
13.		UNKNOWN OXY. HYDROCARBON	34.44	1100	J
14.		UNKNOWN CARBOXYLIC ACID	35.08	390	J
15.		UNKNOWN OXY. HYDROCARBON	35.72	540	J
16.		UNKNOWN OXY. HYDROCARBON	37.52	390	J
17.		UNKNOWN HYDROCARBON	38.03	330	J
18.		UNKNOWN OXY. HYDROCARBON	38.10	520	J
19.		UNKNOWN	40.07	1300	J
20.		UNKNOWN	40.55	340	J
21.		UNKNOWN	41.14	370	J

1F

URS SAMPLE NO.

17730

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 583 SAS No.: SDG No.: 17717

Matrix: (soil/water) SOIL Lab Sample ID: 17730

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4634

Level: (low/med) LOW Date Received: 11/16/94

% Moisture: 25 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.16	350	J
2.		UNKNOWN	5.54	2700	BJ
3.	12-34-22	Aldol Condensation Product	6.15	33000	ABJN
4.		UNKNOWN	7.81	910	BJ
5.		UNKNOWN	8.63	240	BJ
6.		UNKNOWN	8.89	240	J
7.		UNKNOWN	13.12	4800	J
8.		UNKNOWN	14.64	360	J
9.		UNKNOWN	16.31	3900	J
10.		UNKNOWN	22.70	730	J
11.		UNKNOWN	24.83	470	J
12.		UNKNOWN	25.84	560	J
13.		UNKNOWN CARBOXYLIC ACID	26.24	200	J
14.		UNKNOWN	26.78	440	J
15.		UNKNOWN	27.65	430	J
16.		UNKNOWN	28.58	470	J
17.		UNKNOWN	30.79	600	J
18.		UNKNOWN	33.56	460	J
19.		UNKNOWN	34.82	350	J
20.		UNKNOWN	37.12	280	J

1F

URS SAMPLE NO.

17817

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17817

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4635

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 17 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.6

Number TICs found: 21 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.17	560	J
2.		UNKNOWN HYDROCARBON	5.54	290	J
3.	12-34-22	Aldol Condensation Product	5.79	3800	ABJN
4.		UNKNOWN	7.87	850	BJ
5.		UNKNOWN	8.67	380	BJ
6.		UNKNOWN	9.82	340	J
7.		UNKNOWN	13.11	3900	J
8.		UNKNOWN	16.30	3200	J
9.		UNKNOWN	22.69	180	J
10.		UNKNOWN	25.84	490	J
11.		UNKNOWN CARBOXYLIC ACID	26.25	250	J
12.		UNKNOWN	27.64	360	J
13.		UNKNOWN	30.79	471	J
14.		UNKNOWN	33.57	400	J
15.		UNKNOWN	34.83	400	J
16.		UNKNOWN OXY. HYDROCARBON	35.72	350	J
17.		UNKNOWN HYDROCARBON	36.64	380	J
18.		UNKNOWN	37.11	300	J
19.		UNKNOWN HYDROCARBON	38.03	460	J
20.		UNKNOWN	39.40	360	J
21.		UNKNOWN	40.47	320	J

1F

URS SAMPLE NO.

17818

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17818

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4636

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 12 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.7

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.17	550	J
2.		UNKNOWN	5.56	2200	BJ
3.	12-34-22	Aldol Condensation Product	6.12	24000	ABJN
4.		UNKNOWN	7.84	780	BJ
5.		UNKNOWN	8.23	440	J
6.		UNKNOWN	9.80	520	J
7.		UNKNOWN	13.13	3600	J
8.		UNKNOWN	14.63	300	J
9.		UNKNOWN	16.30	3000	J
10.		UNKNOWN	20.33	150	J
11.		UNKNOWN	22.69	480	J
12.		UNKNOWN	24.83	400	J
13.		UNKNOWN	25.85	480	J
14.		UNKNOWN	26.78	310	J
15.		UNKNOWN	27.64	370	J
16.		UNKNOWN	28.59	390	J
17.		UNKNOWN	30.78	480	J
18.		UNKNOWN	33.57	410	J
19.		UNKNOWN	34.83	330	J
20.		UNKNOWN OXY. HYDROCARBON	37.52	470	J
21.		UNKNOWN	40.23	740	J

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

URS SAMPLE NO.

17821

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17821

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4639

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 22 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.6

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	7.86	930	BJ
2.		UNKNOWN	8.25	790	J
3.		UNKNOWN	8.66	180	BJ
4.		UNKNOWN	13.10	2800	J
5.		UNKNOWN	14.64	180	J
6.		UNKNOWN	16.29	2200	J
7.		UNKNOWN	22.69	310	J
8.		UNKNOWN	24.84	240	J
9.		UNKNOWN	25.84	300	J
10.		UNKNOWN ACID	26.25	170	J
11.		UNKNOWN	26.79	210	J
12.		UNKNOWN	27.64	250	J
13.		UNKNOWN	28.58	240	J
14.		UNKNOWN	30.79	290	J
15.		UNKNOWN	33.56	260	J
16.		UNKNOWN	34.83	240	J
17.		UNKNOWN OXY. HYDROCARBON	35.73	350	J
18.		UNKNOWN HYDROCARBON	38.03	250	J
19.		UNKNOWN	40.32	280	J
20.		UNKNOWN	40.72	420	J

1F

URS SAMPLE NO.

17821RE

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17821RE

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4665

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 22 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/07/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.6

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	7.82	1000	BJ
2.		UNKNOWN	8.20	870	J
3.		UNKNOWN	8.59	200	BJ
4.		UNKNOWN	9.75	360	J
5.		UNKNOWN	11.11	410	J
6.		UNKNOWN	13.03	2900	J
7.		UNKNOWN	16.21	2200	J
8.		UNKNOWN	17.58	290	J
9.		UNKNOWN	20.25	330	J
10.		UNKNOWN	22.61	300	J
11.		UNKNOWN	24.74	230	J
12.		UNKNOWN	25.76	300	J
13.		UNKNOWN	26.69	210	J
14.		UNKNOWN	27.55	240	J
15.		UNKNOWN	28.48	280	J
16.		UNKNOWN	30.69	370	J
17.		UNKNOWN	33.46	320	J
18.		UNKNOWN	34.73	280	J
19.		UNKNOWN OXY. HYDROCARBON	35.64	330	J
20.		UNKNOWN OXY. HYDROCARBON	37.95	280	J

1F

URS SAMPLE NO.

17820

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17820

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4638

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 9 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.5

Number TICs found: 20 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.08	160	J
2.		UNKNOWN	5.16	210	J
3.	12-34-22	Aldol Condensation Product	5.68	2400	ABJN
4.		UNKNOWN	7.86	970	J
5.		UNKNOWN	8.65	290	J
6.		UNKNOWN	9.81	210	J
7.		UNKNOWN	13.12	3000	J
8.		UNKNOWN	14.64	230	J
9.		UNKNOWN	16.31	2400	J
10.		UNKNOWN	20.32	120	J
11.		UNKNOWN	22.70	440	J
12.		UNKNOWN	24.84	290	J
13.		UNKNOWN	25.84	350	J
14.		UNKNOWN CARBOXYLIC ACID	26.25	130	J
15.		UNKNOWN	26.79	250	J
16.		UNKNOWN	27.65	280	J
17.		UNKNOWN	28.58	260	J
18.		UNKNOWN	30.78	320	J
19.		UNKNOWN	33.57	290	J
20.		UNKNOWN	34.83	240	J

1F

URS SAMPLE NO.

17822

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 602 SAS No.: SDG No.: 17811

Matrix: (soil/water) SOIL Lab Sample ID: 17822

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4640

Level: (low/med) LOW Date Received: 11/17/94

% Moisture: 14 decanted: (Y/N) N Date Extracted: 11/21/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.3

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.19	410	J
2.		UNKNOWN	5.52	1900	BJ
3.	12-34-22	Aldol Condensation Product	6.14	23000	ABJN
4.		UNKNOWN	7.83	600	BJ
5.		UNKNOWN	9.80	380	J
6.		UNKNOWN	13.10	3000	J
7.		UNKNOWN	16.30	2500	J
8.		UNKNOWN	20.33	120	J
9.		UNKNOWN	22.69	400	J
10.		UNKNOWN	24.83	270	J
11.		UNKNOWN	25.85	370	J
12.		UNKNOWN CARBOXYLIC ACID	26.26	330	J
13.		UNKNOWN	26.79	220	J
14.		UNKNOWN	27.64	260	J
15.		UNKNOWN OXY. HYDROCARBON	35.72	610	J
16.		UNKNOWN	36.48	440	J
17.		UNKNOWN OXY. HYDROCARBON	37.52	420	J
18.		UNKNOWN HYDROCARBON	38.03	1100	J
19.		UNKNOWN HYDROCARBON	40.01	370	J
20.		UNKNOWN	40.18	800	J
21.		UNKNOWN	40.72	430	J

1F

URS SAMPLE NO.

18729

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: E & E INC. Contract:

Lab Code: EANDE Case No.: 749 SAS No.: SDG No.: 18637

Matrix: (soil/water) SOIL Lab Sample ID: 18729

Sample wt/vol: 30.0 (g/mL) G Lab File ID: B4820

Level: (low/med) LOW Date Received: 12/08/94

% Moisture: 8 decanted: (Y/N) N Date Extracted: 12/12/94

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 12/16/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

Number TICs found: 7 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

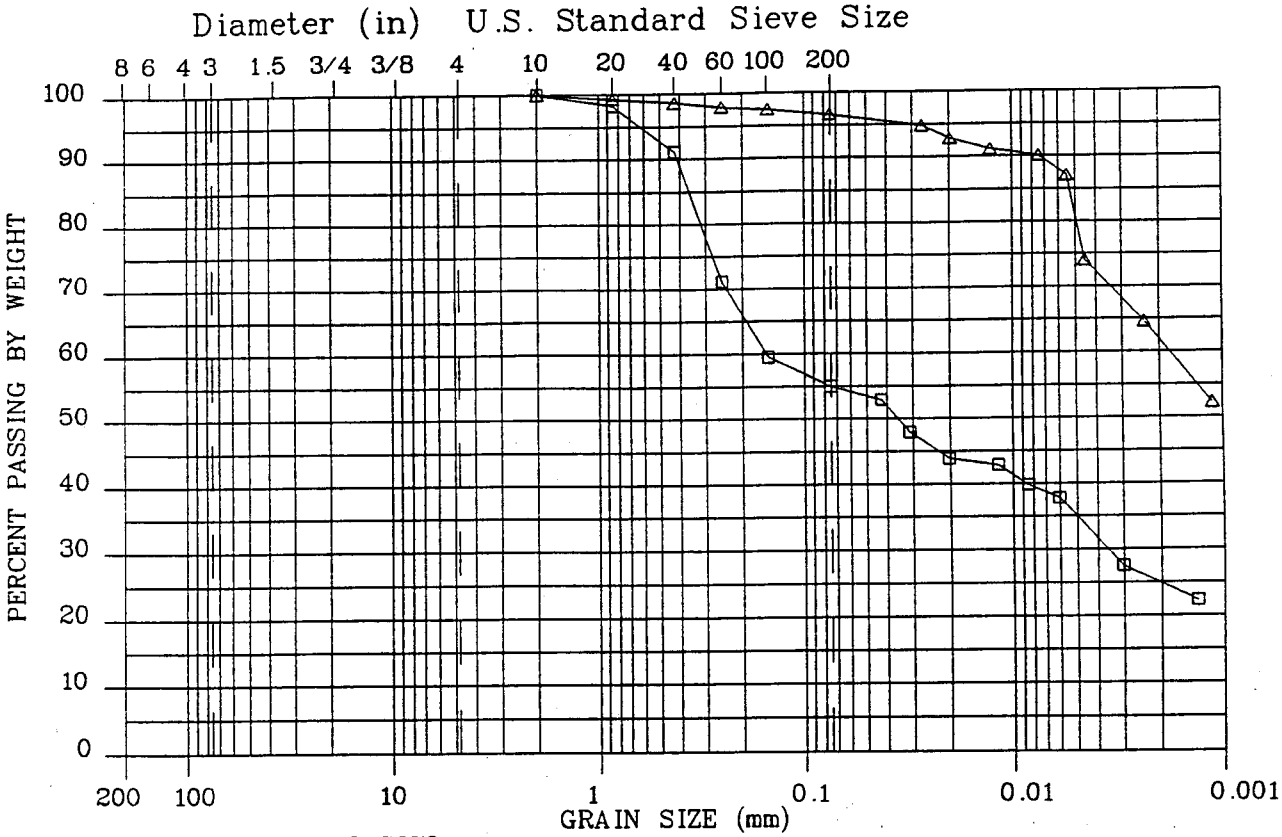
CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 12-34-22	Aldol Condensation Product	6.04	39000	ABJN
2.	UNKNOWN	7.47	1000	BJ
3.	UNKNOWN	8.30	950	BJ
4.	UNKNOWN	9.92	450	BJ
5.	UNKNOWN HYDROCARBON	22.29	120	J
6.	UNKNOWN	27.53	81	J
7.	UNKNOWN	36.13	140	J

Appendix E

Geotechnical Testing Results

GeoSystems Consultants
Fort Washington Laboratory
Particle Size Distribution

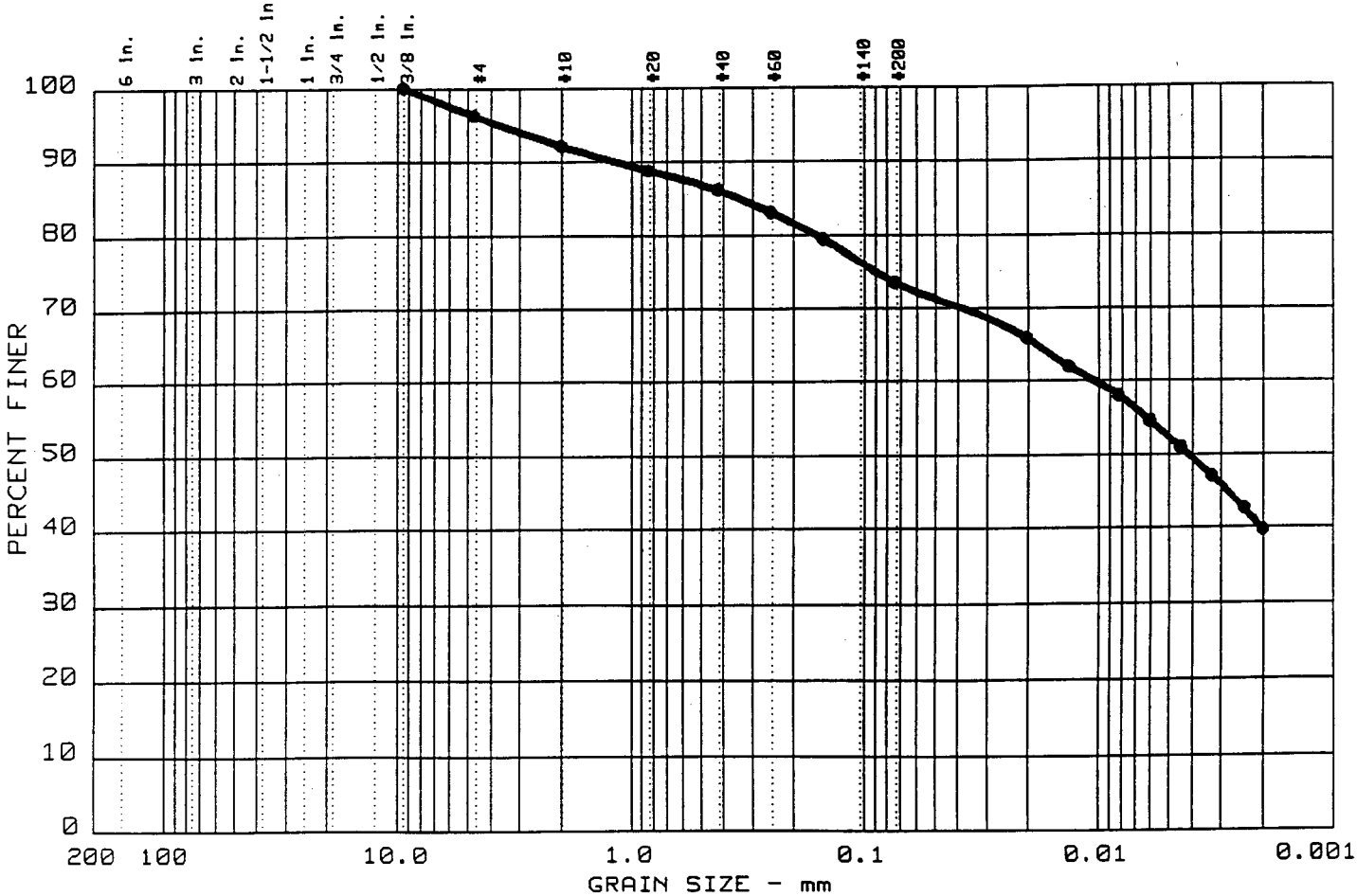
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



JOB NUMBER : 94G078
JOB NAME : URS;SS-034 SOUTH CLEAR ZONE

SYM	BORING#	SAMPLE#	DEPTH	DESCRIPTION	W(%)	W_L (%)	W_P (%)
□	WB-MW-34	001	2-4	GRAY SANDY SILTY CLAY (CL)		29	16
△	WB-MW-34	001	6-8	GRAY SILTY CLAY (CH)		70	30

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	3.8	22.6	21.3	52.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	40	23	0.33		0.00					

MATERIAL DESCRIPTION	USCS	AASHTO
● GREY CLAY, Some Sand & Silt, trace gravel .	CL	

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-34-001 / 10'- 12'

Date: DECEMBER 6, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Remarks:

CLIENT: URS CONSULTANTS

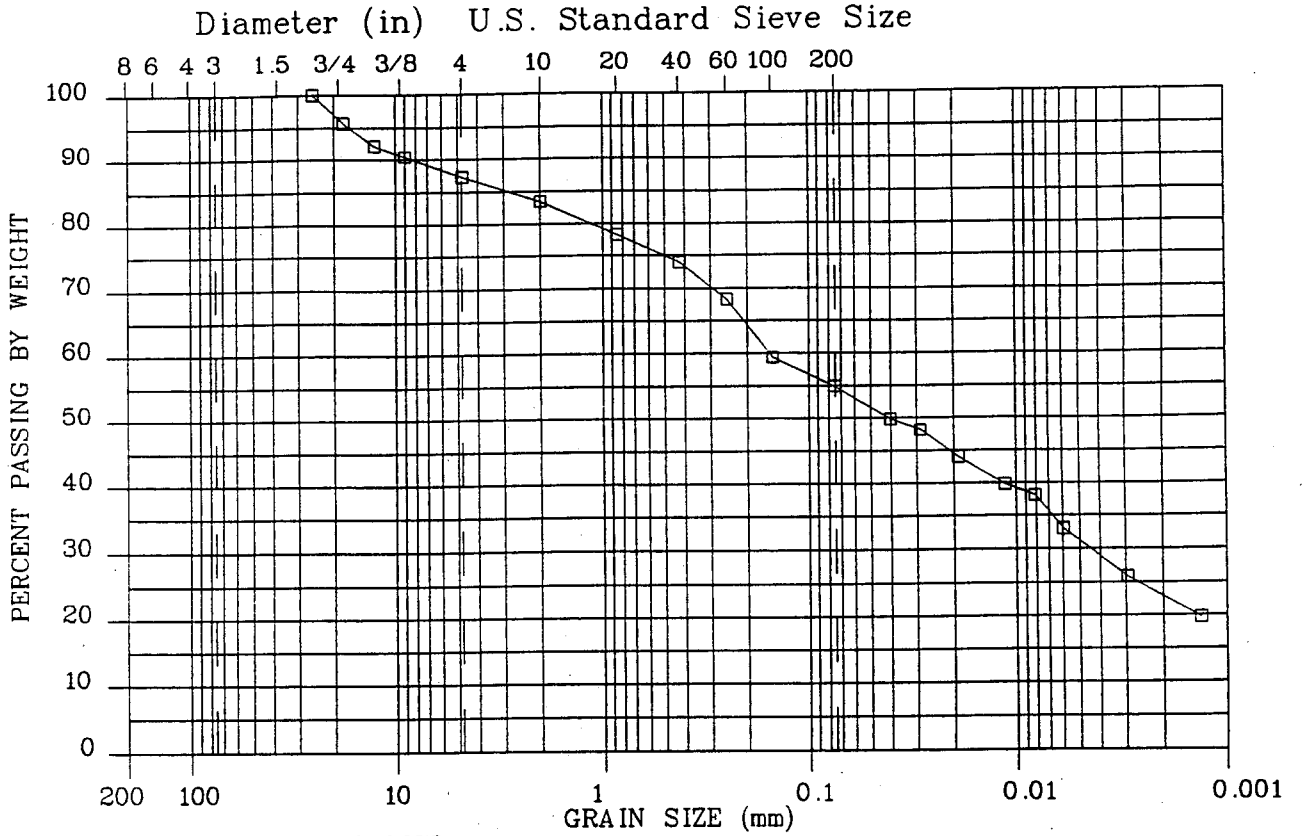
WATER CONTENT: 28.9%

LAB NO. 2168.018

Figure No. 1

GeoSystems Consultants
Fort Washington Laboratory
Particle Size Distribution

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

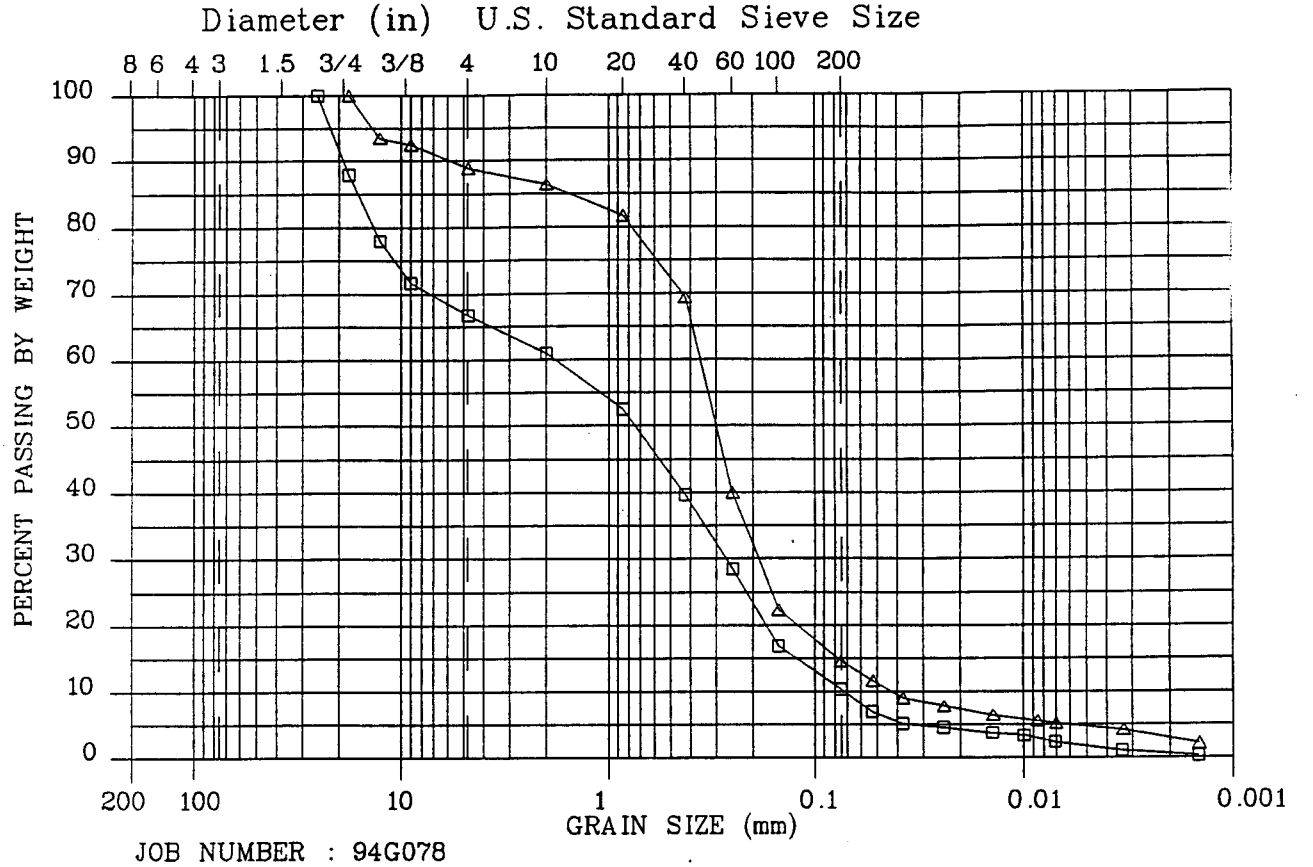


JOB NUMBER : 94G078
JOB NAME : URS: SS-034 SOUTH CLEAR ZONE

SYM	BORING#	SAMPLE#	DEPTH	DESCRIPTION	W(%)	W_L (%)	W_P (%)
□	WB-MW-34	001	16-18	GRAY GRAVELLY SANDY SILTY CLAY (CL)		25	13

GeoSystems Consultants
Fort Washington Laboratory
Particle Size Distribution

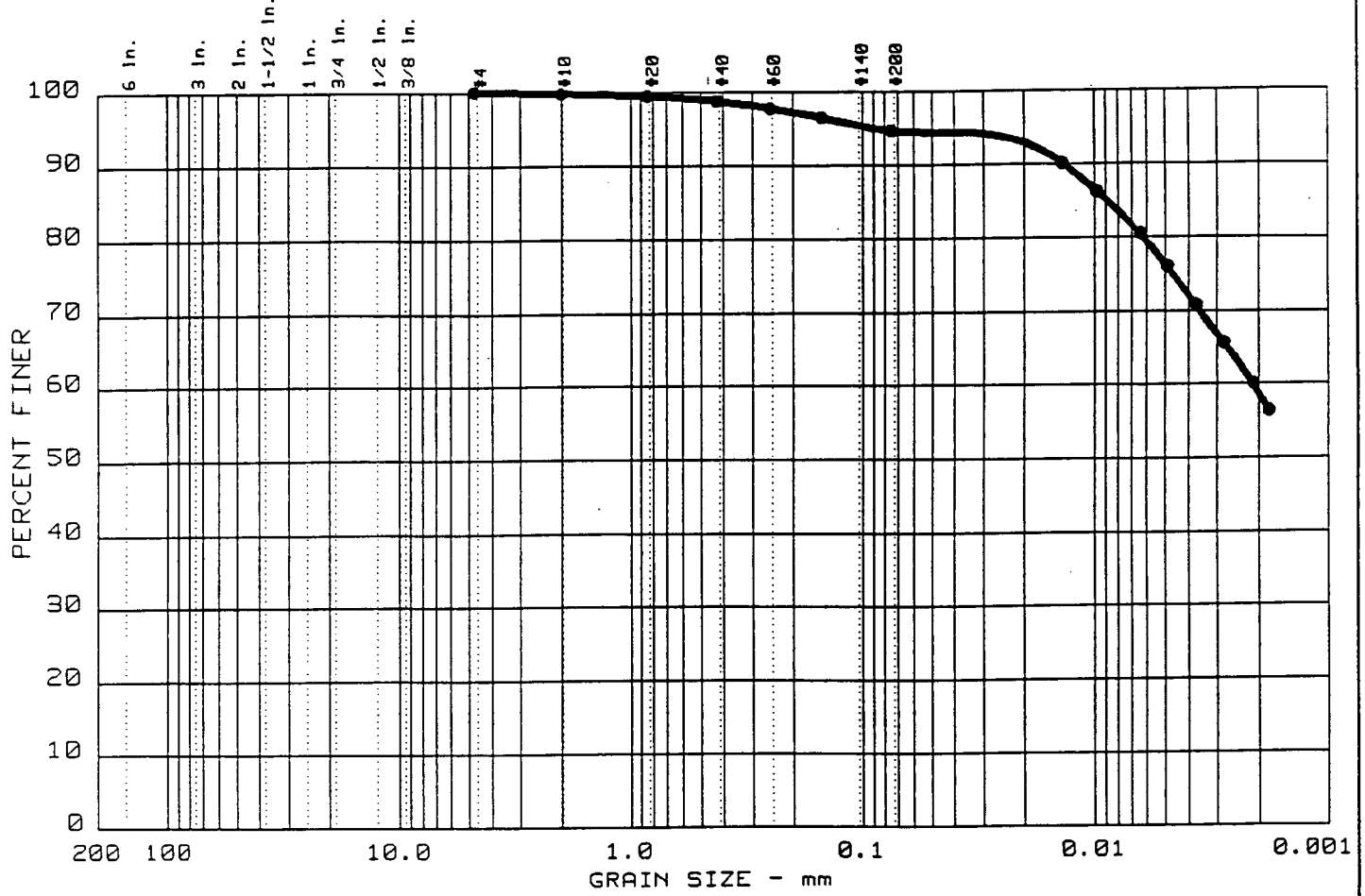
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



JOB NUMBER : 94G078
JOB NAME : URS: SS-034 SOUTH CLEAR ZONE

SYM	BORING#	SAMPLE#	DEPTH	DESCRIPTION	W(%)	W_L (%)	W_P (%)
□	WB-MW-34	003	0-2	GRAY SILTY GRAVELLY COARSE TO FINE SAND (SM)			
△	SB-34	007	0-2	GRAY SILTY GRAVELLY COARSE TO FINE SAND (SM)			

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	0.0	5.4	18.2	76.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	61	39								

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN CLAY, Little Silt, trace sand	CH	

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-34-003 / 7'- 9'

Date: DECEMBER 6, 1994

GRAIN SIZE DISTRIBUTION TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Remarks:
CLIENT: URS CONSULTANTS
WATER CONTENT: 34.8%

LAB NO. 2168.019

Figure No. 1

PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 9.08
Specimen Diameter (cm): 7.09
Dry Unit Weight (pcf): 71.8
Moisture Before Test (%): 50.5
Moisture After Test (%): 48.5

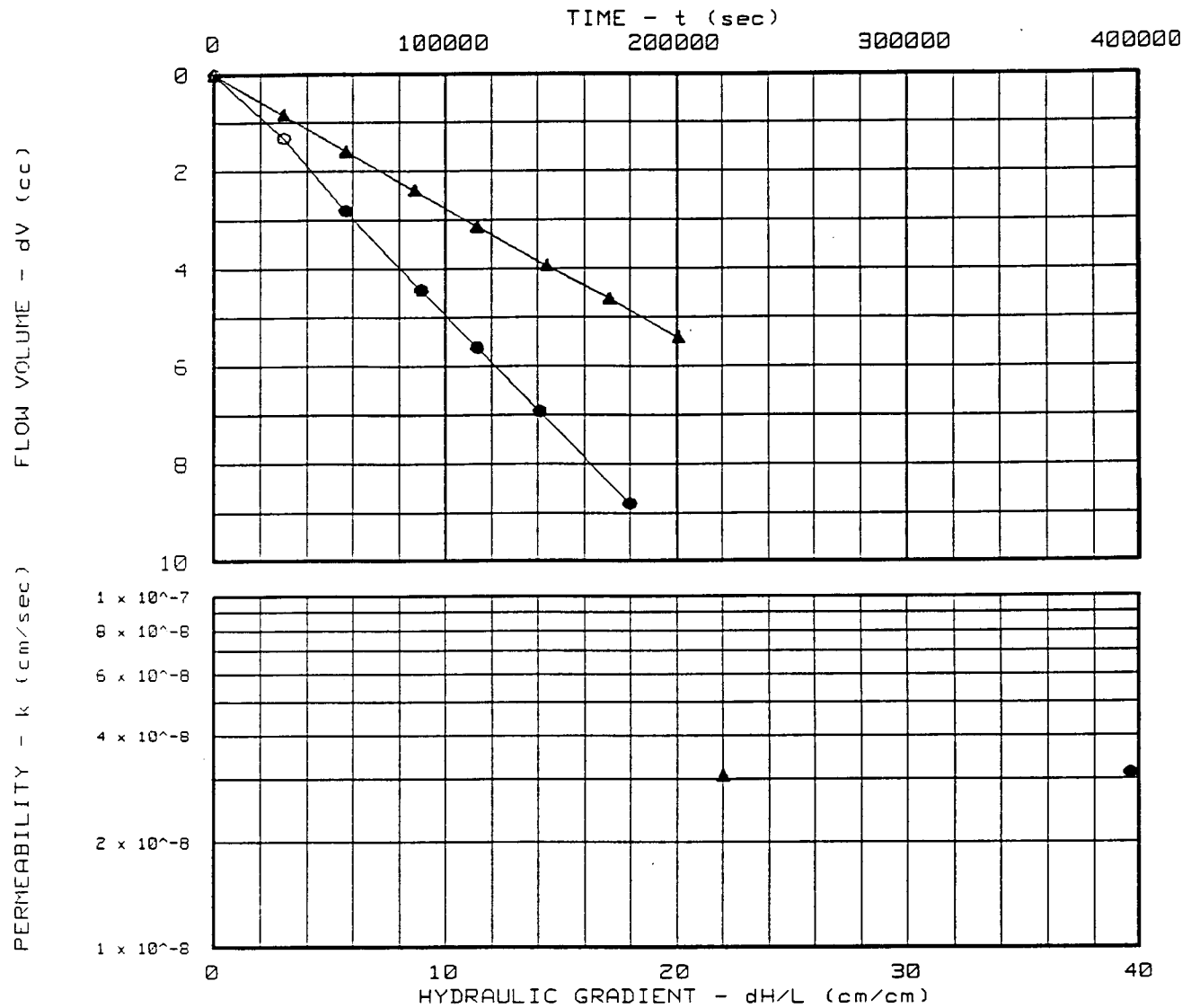
Run Number:	1 ●	2 ▲
Cell Pressure (psi):	95.0	95.0
Test Pressure (psi):	85.0	82.6
Back Pressure (psi):	79.9	79.8
Diff. Head (psi):	5.1	2.8
Flow Rate (cc/sec):	4.88 x 10^-5	2.67 x 10^-5
Perm. (cm/sec):	3.12 x 10^-8	3.07 x 10^-8

SAMPLE DATA:

Sample Identification: WB-MW-34-001
DEPTH: 10'- 12'
Visual Description: GREY CLAY, Some Sand & Silt
Remarks:

Maximum Dry Density (pcf):
Optimum Moisture Content (%):

Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: UNDISTURBED



Project: PLATTSBURGH AIR FORCE BASE
Location: PLATTSBURGH, NEW YORK
Date: DEC. 1994

PERMEABILITY TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Project No.:
File No.: G008.018
Lab No.: 2168.018
Tested by: KJC
Checked by: JFC ✓
Test: CH - Constant head

PERMEABILITY TEST DATA

PROJECT DATA

Project Name:	PLATTSBURGH AIR FORCE BASE
File No.:	G008.018
Project Location:	PLATTSBURGH, NEW YORK
Project No.:	
Sample Identification:	WB-MW-34-001
	DEPTH: 10'- 12'
Lab No.:	2168.018
Description:	GREY CLAY, Some Sand & Silt
Sample Type:	UNDISTURBED
Max. Dry Dens.:	
Method (D1557/D698):	
Opt. Water Content:	
Date:	DEC. 1994
Remarks:	
Permeameter Type:	FLEXIBLE WALL
Tested by:	KJC
Checked by:	JFC
Test type:	CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.786 in	2.848 in		2.719 in	2.767 in	
Middle:	2.752 in	2.789 in		2.733 in	2.716 in	
Bottom:	2.792 in	2.831 in		2.738 in	2.739 in	
Average:	2.79 in	7.09 cm		2.73 in	6.94 cm	
Length:	1	2	3	1	2	3
	3.555 in	3.594 in	3.578 in	3.524 in	3.521 in	3.537 in
Average:	3.58 in	9.08 cm		3.53 in	8.96 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.75	
Wet Wt. & Tare:	849.30	841.20
Dry Wt. & Tare:	641.00	641.00
Tare Wt.:	228.50	228.50
Moisture Content:	50.5 %	48.5 %
Dry Unit Weight:	71.8 pcf	76.0 pcf
Porosity:	0.5820	0.5575
Saturation:	99.7 %	105.9 %

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: FP-31 Panel No.: 10 Positions: 4&3

	Run Number: 1	2
Cell Pressure:	95.0 psi	95.0 psi
Saturation Pressure:	80.0 psi	80.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	20.0 °C	20.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	GAUGE PRESSURE-psi OUT	BURET READING-cc IN	BURET READING-cc OUT	FLOW VOLUME-cc AVERAGE
S X	12/ 2/94	8:00:00	0	85.0	80.0	0.00	24.75	0.00
X	12/ 2/94	16:20:00	30,000	85.0	80.0	1.25	23.35	1.33
	12/ 2/94	23:50:00	57,000	85.0	80.1	2.75	21.85	2.83
	12/ 3/94	9:00:00	90,000	84.9	80.1	4.35	20.20	4.45
	12/ 3/94	15:40:00	114,000	84.9	80.1	5.50	19.00	5.63
	12/ 3/94	23:10:00	141,000	85.0	80.0	6.85	17.70	6.95
	12/ 4/94	10:00:00	180,000	85.0	80.0	8.75	15.85	8.83

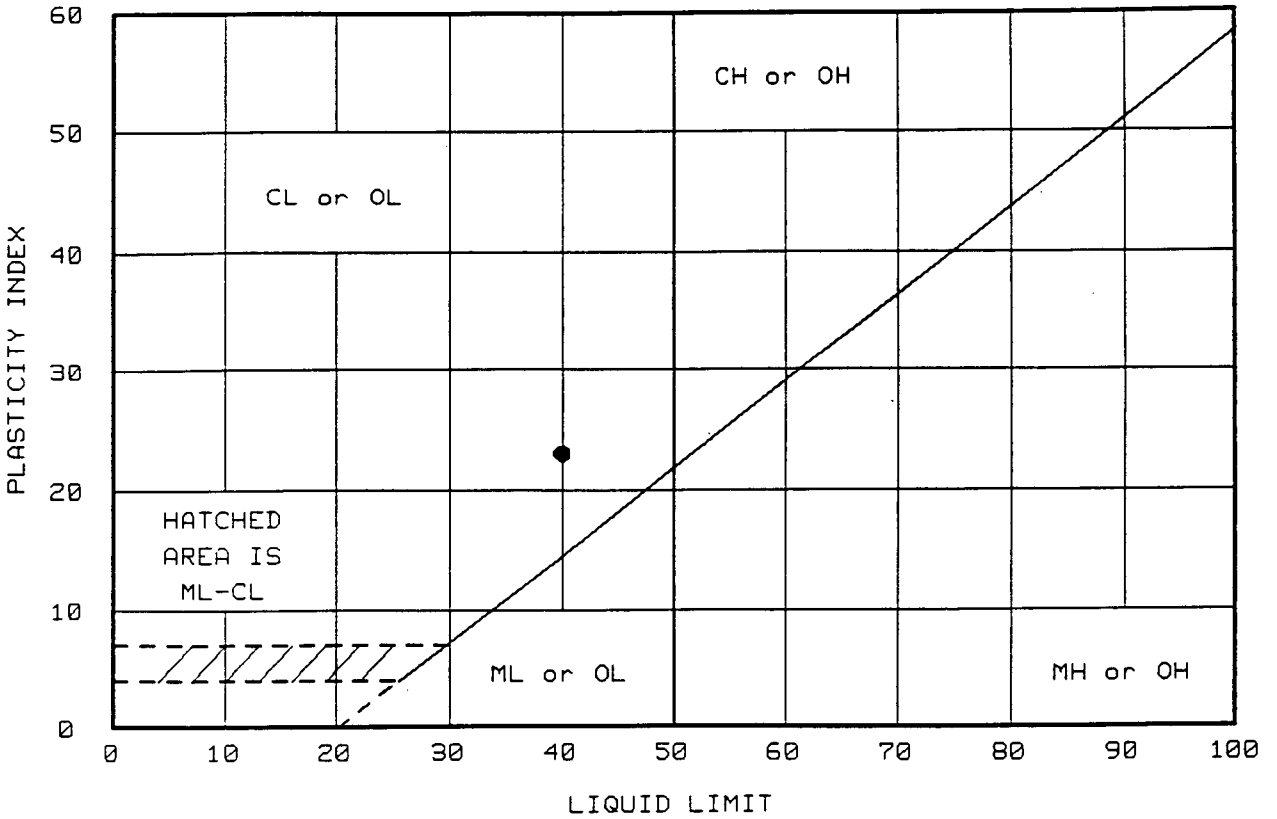
Test Pressure = 85.0 psi Differential Head = 5.1 psi, 359.6 cm H2O
Gradient = 3.959E 01 Flow rate = 4.881E-05 cc/sec R squared = 0.99997
Permeability, K20.0° = 3.120E-08 cm/sec, K20° = 3.120E-08 cm/sec

SECOND RUN PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	GAUGE PRESSURE-psi OUT	BURET READING-cc IN	BURET READING-cc OUT	FLOW VOLUME-cc AVERAGE
S X	12/ 5/94	7:45:00	0	82.6	80.1	0.05	24.90	0.00
	12/ 5/94	16:05:00	30,000	82.6	80.1	0.90	24.05	0.85
	12/ 5/94	23:35:00	57,000	82.6	80.1	1.65	23.30	1.60
	12/ 6/94	7:55:00	87,000	82.7	80.1	2.40	22.45	2.40
	12/ 6/94	15:25:00	114,000	82.6	80.1	3.15	21.70	3.15
	12/ 6/94	23:45:00	144,000	82.7	80.2	3.95	20.90	3.95
	12/ 7/94	7:15:00	171,000	82.7	80.1	4.60	20.20	4.63
	12/ 7/94	15:35:00	201,000	82.6	80.0	5.40	19.40	5.43

Test Pressure = 82.6 psi Differential Head = 2.8 psi, 199.9 cm H2O
Gradient = 2.201E 01 Flow rate = 2.672E-05 cc/sec R squared = 0.99981
Permeability, K20.0° = 3.073E-08 cm/sec, K20° = 3.073E-08 cm/sec

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	WB-MW-34-001 10'- 12'	40	17	23	73.59	CL, Lean clay with sand

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE

Client: URS CONSULTANTS
Location: PLATTSBURGH, NEW YORK

Date: DEC. 6, 1994

LIQUID AND PLASTIC LIMITS TEST REPORT

HUNTINGTON ENGINEERING & ENVIRONMENTAL, INC.

Remarks:
SIEVED THRU #40 SIEVE

LAB NO. 2168.018

Fig. No. 1

PERMEABILITY TEST REPORT

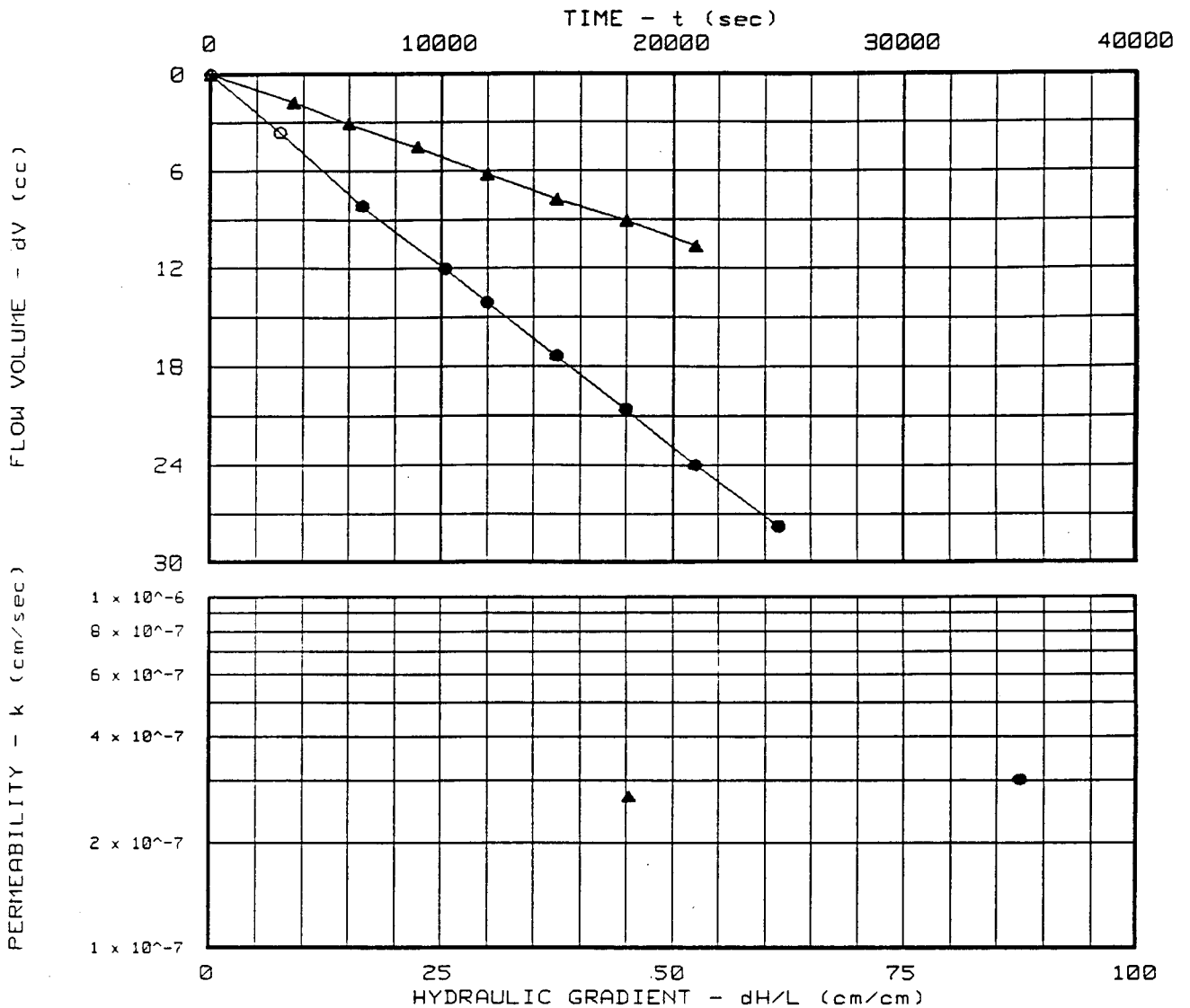
TEST DATA:

Specimen Height (cm): 8.25
Specimen Diameter (cm): 7.27
Dry Unit Weight (pcf): 100.1
Moisture Before Test (%): 23.2
Moisture After Test (%): 23.8

Run Number:	1 ●	2 ▲
Cell Pressure (psi):	95.0	95.0
Test Pressure (psi):	90.0	85.0
Back Pressure (psi):	79.7	79.7
Diff. Head (psi):	10.3	5.3
Flow Rate (cc/sec):	1.09 x 10^-3	5.07 x 10^-4
Perm. (cm/sec):	3.01 x 10^-7	2.70 x 10^-7

SAMPLE DATA:

Sample Identification: WB-MW-34-003
DEPTH: 7'- 9'
Visual Description: BROWN SILT AND CLAY, Little Sand
Remarks: BLOCKY - NEAR VERTICLE FISSURES
Maximum Dry Density (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter type: FLEXIBLE WALL
Sample type: UNDISTURBED



Project: PLATTSBURGH AIR FORCE BASE
Location: PLATTSBURGH, NEW YORK
Date: DEC. 1994

PERMEABILITY TEST REPORT

HUNTINGDON ENGINEERING & ENVIRONMENTAL

Project No.:
File No.: G008.018
Lab No.: 2168.019
Tested by: KJC
Checked by: JFC ✓
Test: CH - Constant head

PERMEABILITY TEST DATA

PROJECT DATA

Project Name:	PLATTSBURGH AIR FORCE BASE
File No.:	G008.018
Project Location:	PLATTSBURGH, NEW YORK
Project No.:	
Sample Identification:	WB-MW-34-003
	DEPTH: 7'- 9'
Lab No.:	2168.019
Description:	BROWN SILT AND CLAY, Little Sand
Sample Type:	UNDISTURBED
Max. Dry Dens.:	
Method (D1557/D698):	
Opt. Water Content:	
Date:	DEC. 1994
Remarks:	BLOCKY - NEAR VERTICLE FISSURES
Permeameter Type:	FLEXIBLE WALL
Tested by:	KJC
Checked by:	JFC
Test type:	CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.859 in	2.868 in		2.840 in	2.843 in	
Middle:	2.871 in	2.854 in		2.845 in	2.860 in	
Bottom:	2.859 in	2.856 in		2.846 in	2.849 in	
Average:	2.86 in	7.27 cm		2.85 in	7.24 cm	
Length:	1	2	3	1	2	3
	3.267 in	3.259 in	3.218 in	3.194 in	3.217 in	3.182 in
Average:	3.25 in	8.25 cm		3.20 in	8.12 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.75	
Wet Wt. & Tare:	907.95	911.40
Dry Wt. & Tare:	780.90	780.90
Tare Wt.:	232.15	232.15
Moisture Content:	23.2 %	23.8 %
Dry Unit Weight:	100.1 pcf	102.6 pcf
Porosity:	0.4170	0.4024
Saturation:	89.0 %	97.1 %

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: FP-30 Panel No.: 10 Positions: 2&1

Run Number:	1	2
Cell Pressure:	95.0 psi	95.0 psi
Saturation Pressure:	80.0 psi	80.0 psi
Inflow Corr. Factor:	5.30	5.30
Outflow Corr. Factor:	5.10	5.10
Test Temperature:	20.0 °C	20.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	GAUGE PRESSURE-psi OUT	BURET READING-cc IN	BURET READING-cc OUT	FLOW VOLUME-cc AVERAGE
S X	12/ 6/94	8:40:00	0	90.0	80.1	0.30	24.40	0.00
X	12/ 6/94	9:30:00	3,000	90.1	80.1	1.00	23.70	3.64
	12/ 6/94	10:30:00	6,600	90.0	80.1	1.85	22.80	8.19
	12/ 6/94	11:30:00	10,200	90.0	80.0	2.60	22.05	12.09
	12/ 6/94	12:00:00	12,000	90.0	80.0	3.00	21.65	14.17
	12/ 6/94	12:50:00	15,000	90.0	80.0	3.65	21.05	17.42
	12/ 6/94	13:40:00	18,000	90.0	80.0	4.25	20.40	20.67
	12/ 6/94	14:30:00	21,000	90.0	80.0	4.90	19.75	24.05
	12/ 6/94	15:30:00	24,600	90.0	80.0	5.60	19.00	27.82

Test Pressure = 90.0 psi Differential Head = 10.3 psi, 721.7 cm H2O
Gradient = 8.748E 01 Flow rate = 1.094E-03 cc/sec R squared = 0.99992
Permeability, K20.0° = 3.014E-07 cm/sec, K20° = 3.014E-07 cm/sec

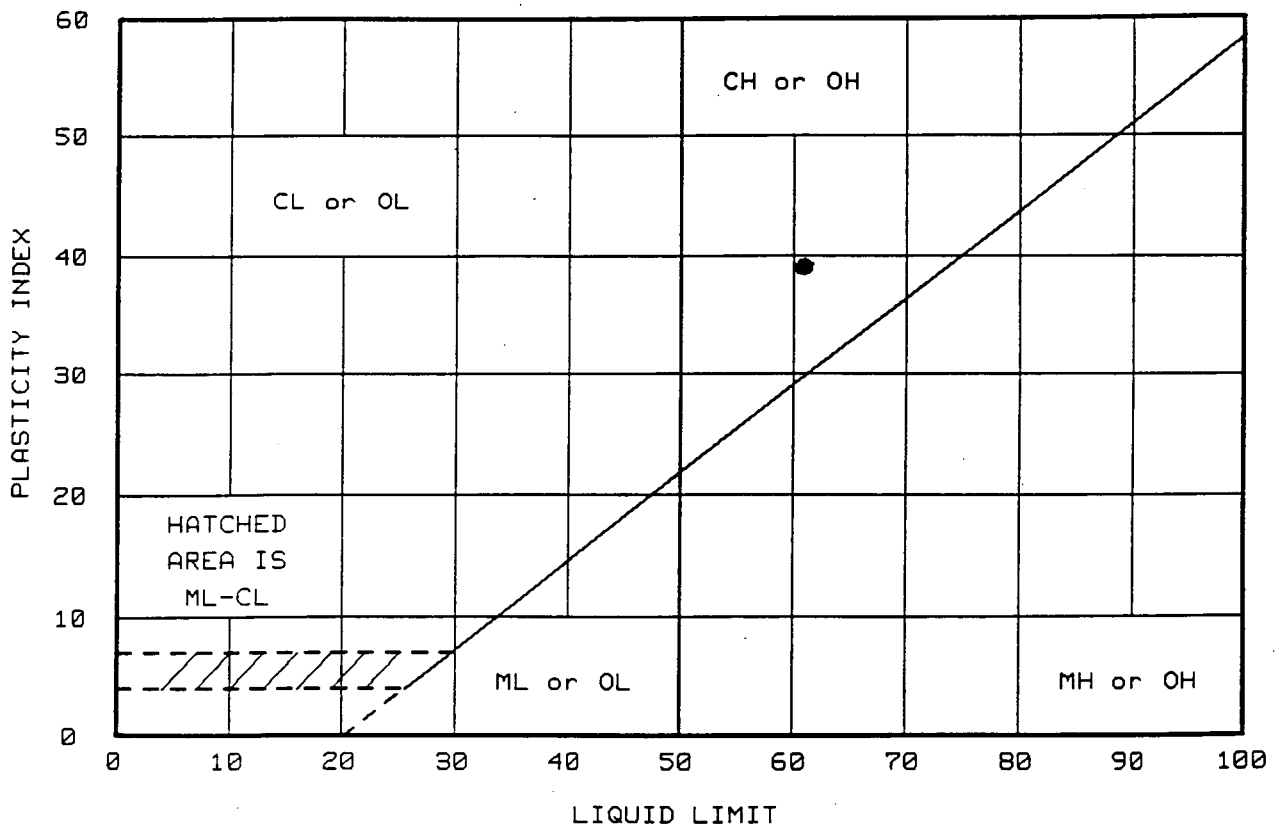
SECOND RUN PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi IN	GAUGE PRESSURE-psi OUT	BURET READING-cc IN	BURET READING-cc OUT	FLOW VOLUME-cc AVERAGE
S X	12/ 7/94	9:30:00	0	85.0	80.1	0.00	24.45	0.00
	12/ 7/94	10:30:00	3,600	85.0	80.0	0.35	24.10	1.82
	12/ 7/94	11:10:00	6,000	85.0	80.0	0.60	23.85	3.12
	12/ 7/94	12:00:00	9,000	85.0	80.0	0.90	23.60	4.55
	12/ 7/94	12:50:00	12,000	85.0	80.0	1.20	23.25	6.24
	12/ 7/94	13:40:00	15,000	84.9	80.1	1.50	22.95	7.80
	12/ 7/94	14:30:00	18,000	85.0	80.0	1.75	22.70	9.10
	12/ 7/94	15:20:00	21,000	84.9	80.0	2.05	22.40	10.66

PERMEABILITY TEST READINGS DATA

Test Pressure = 85.0 psi Differential Head = 5.3 psi, 373.6 cm H2O
Gradient = 4.529E 01 Flow rate = 5.075E-04 cc/sec R squared = 0.99925
Permeability, K20.0° = 2.701E-07 cm/sec, K20° = 2.701E-07 cm/sec

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	ASTM D 2487-90
●	WB-MW-34-003 7'- 9'	61	22	39	94.57	CH, Fat clay

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE

Client: URS CONSULTANTS
Location: PLATTSBURGH, NEW YORK

Date: DEC. 6, 1994

LIQUID AND PLASTIC LIMITS TEST REPORT

HUNTINGTON ENGINEERING & ENVIRONMENTAL, INC.

Remarks:

SIEVED THRU #40 SIEVE

LAB NO. 2168.019

Fig. No. 1

Appendix F

Survey Tie Sheets

TABLE F-1
SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
COORDINATE AND ELEVATION LIST

Sampling Locations	Northing	Easting	Elevation
MW-34-001 (Abandoned)	1690652.504	728952.679	Ground - 147.23
SB-34-02	1690109.191	729022.141	Ground - 145.55
WB-MW-34-003	1690131.688	729111.985	Ground - 146.75
SB-34-04	1690291.213	729116.187	Ground - 145.65
SB-34-05	1690456.486	729042.602	Ground - 147.78
SB-34-06	1690545.150	728986.236	Ground - 147.53
SB-34-07	1690436.122	728957.124	Ground - 147.78
SB-34-08	1690204.802	728924.372	Ground - 146.55

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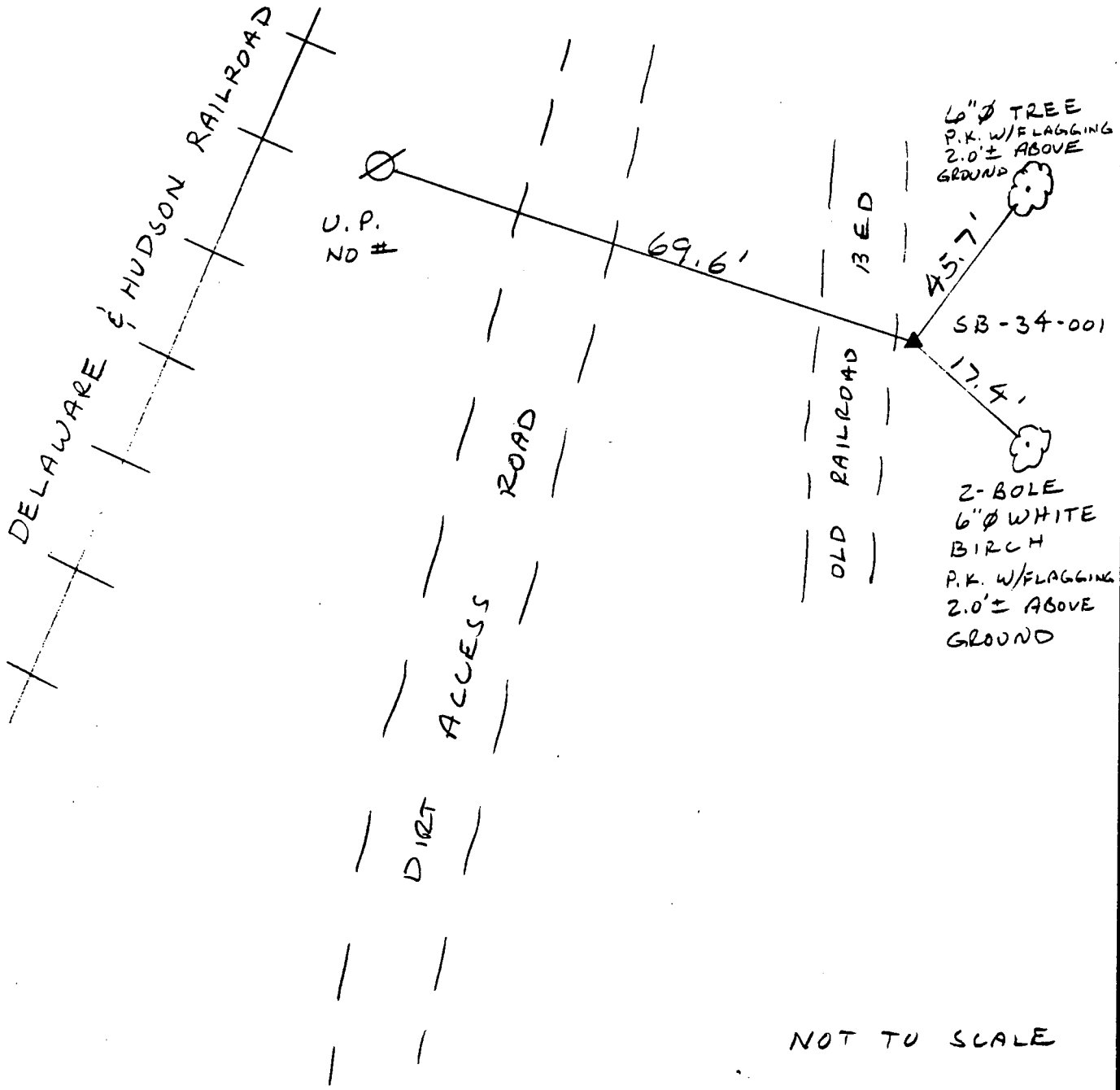
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690652.504
EASTING : 728952.679
GROUND ELEVATION : 147.23
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

WB-MW-34-001
BORING I.D. (SB-34-001)
SITE I.D. SS-034



POSITION RELATIVE TO EXISTING FEATURES

A-5429

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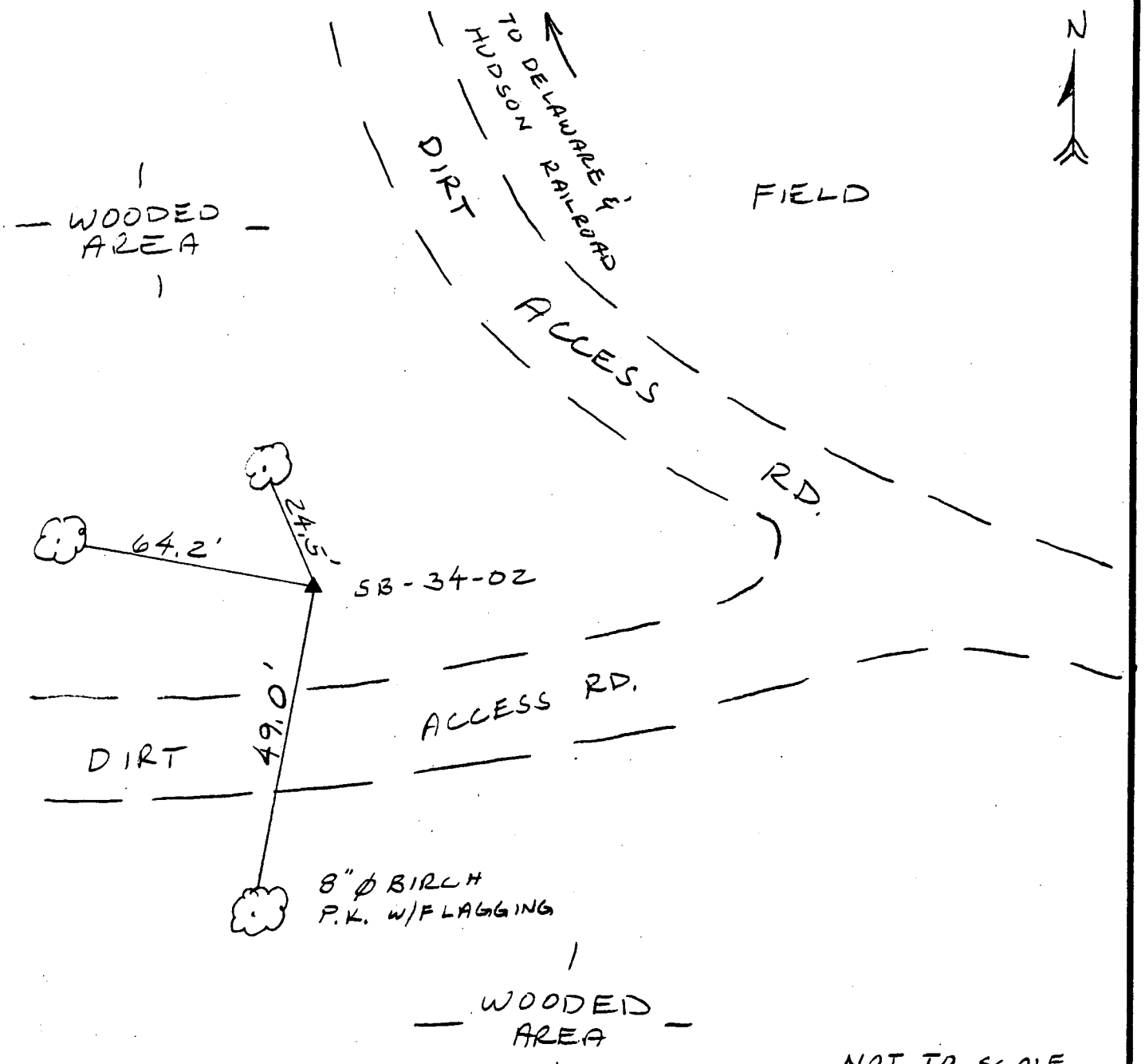
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690109.191
EASTING : 729022.141
GROUND ELEVATION : 145.55
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-02
SITE I.D. SS-034



POSITION RELATIVE TO EXISTING FEATURES

A-5429

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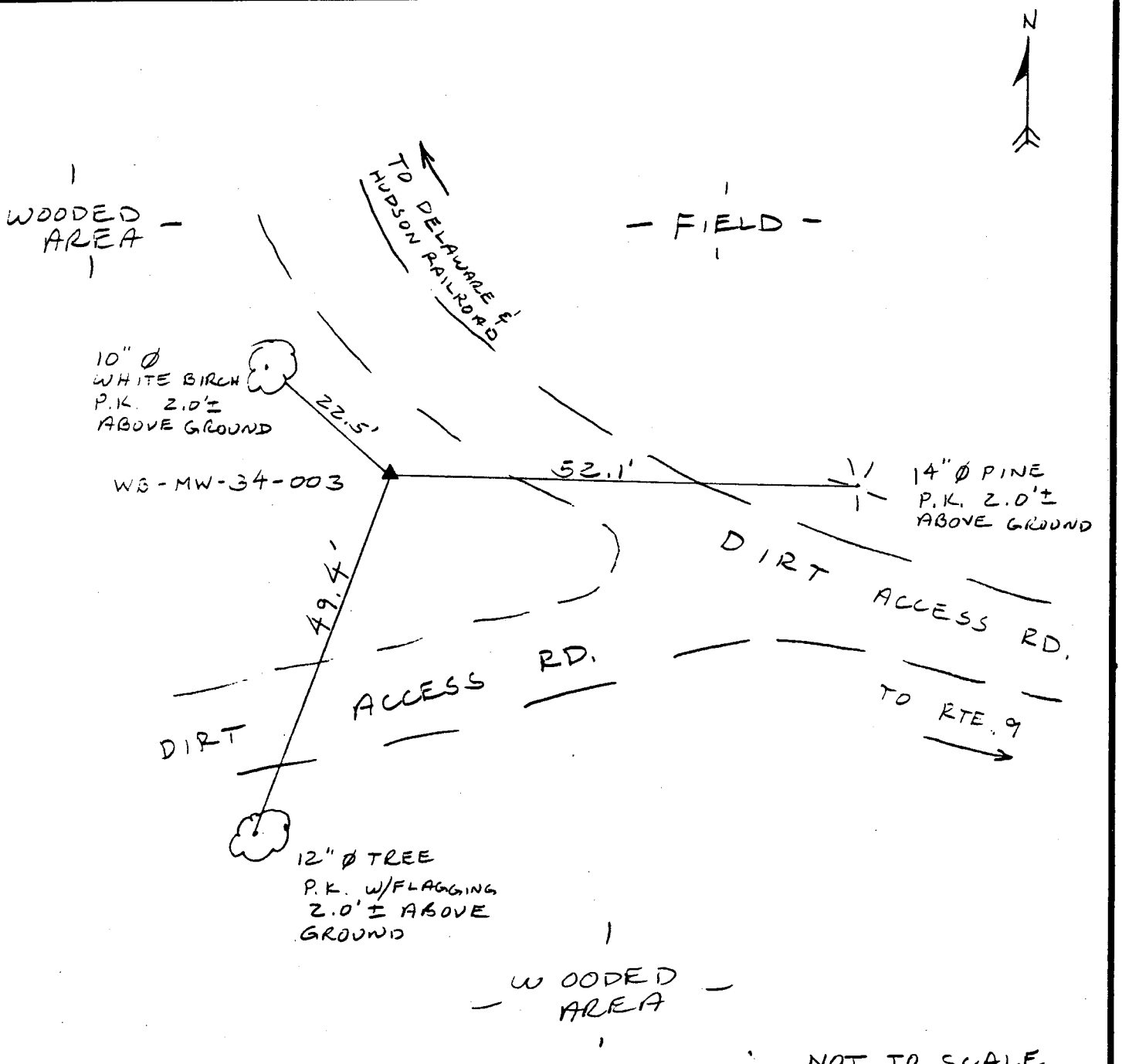
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690131.688
EASTING : 729111.985
GROUND ELEVATION : 146.75
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM.: NGVD 29

BORING I.D. WB-MW-34-003
SITE I.D. SS-034.



POSITION RELATIVE TO EXISTING FEATURES

A-5429

URS
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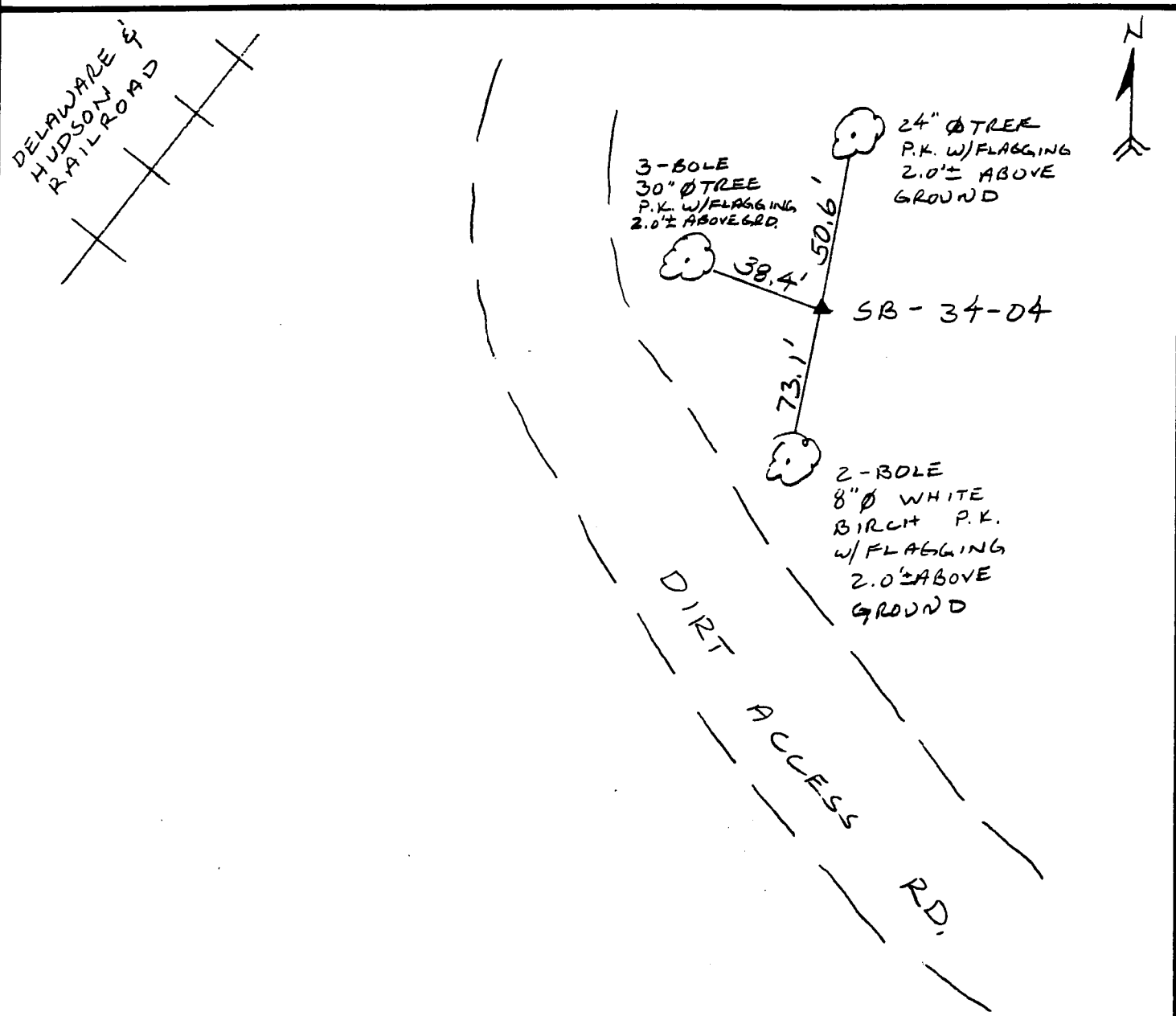
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690291.213
EASTING : 729116.187
GROUND ELEVATION : 145.65
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-04
SITE I.D. SS-034



NOT TO SCALE

POSITION RELATIVE TO EXISTING FEATURES

A-5429

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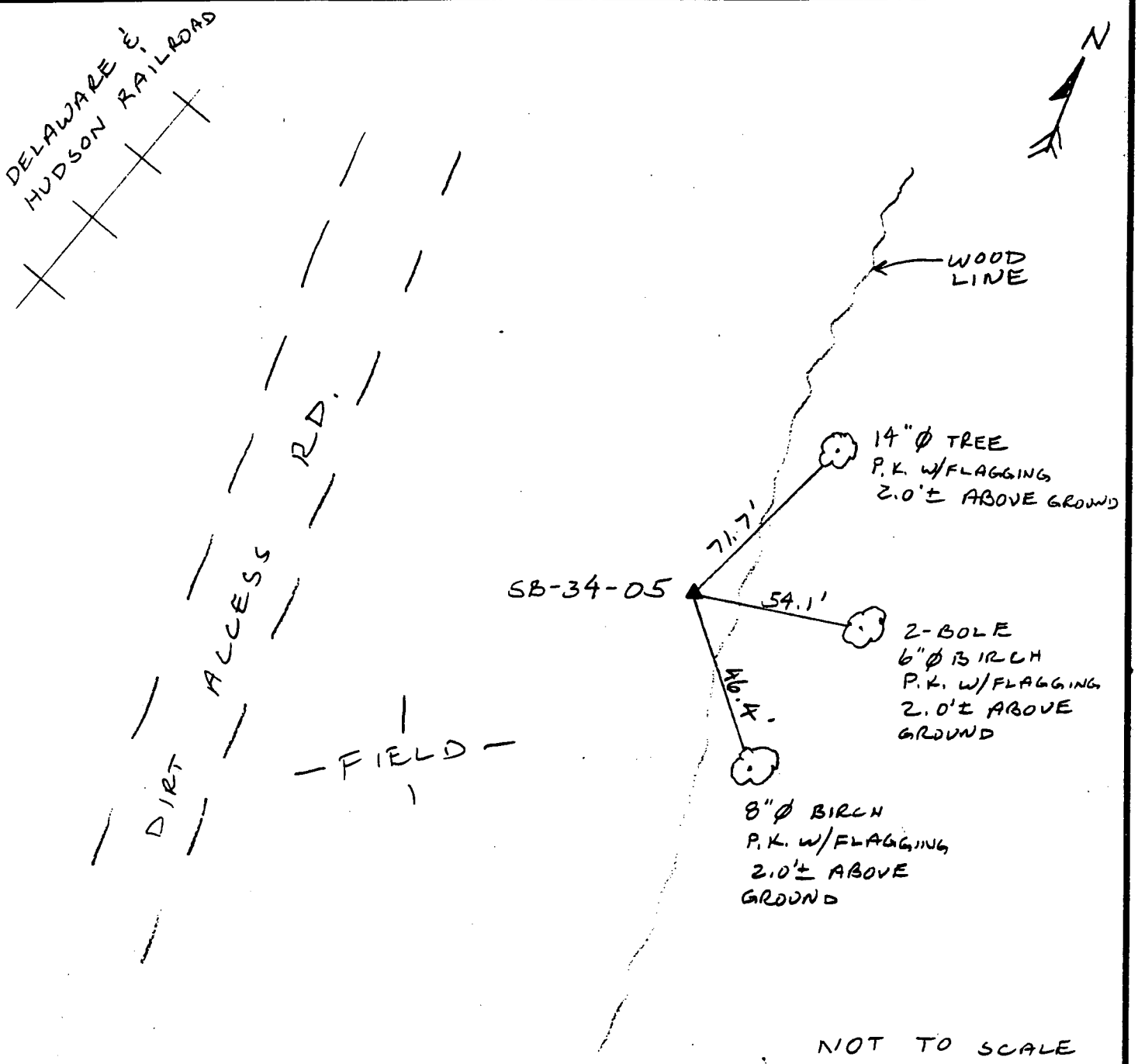
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690456.486
EASTING : 729042.6002
GROUND ELEVATION : 147.78
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-05
SITE I.D. SS-034



POSITION RELATIVE TO EXISTING FEATURES

A-5429

URS
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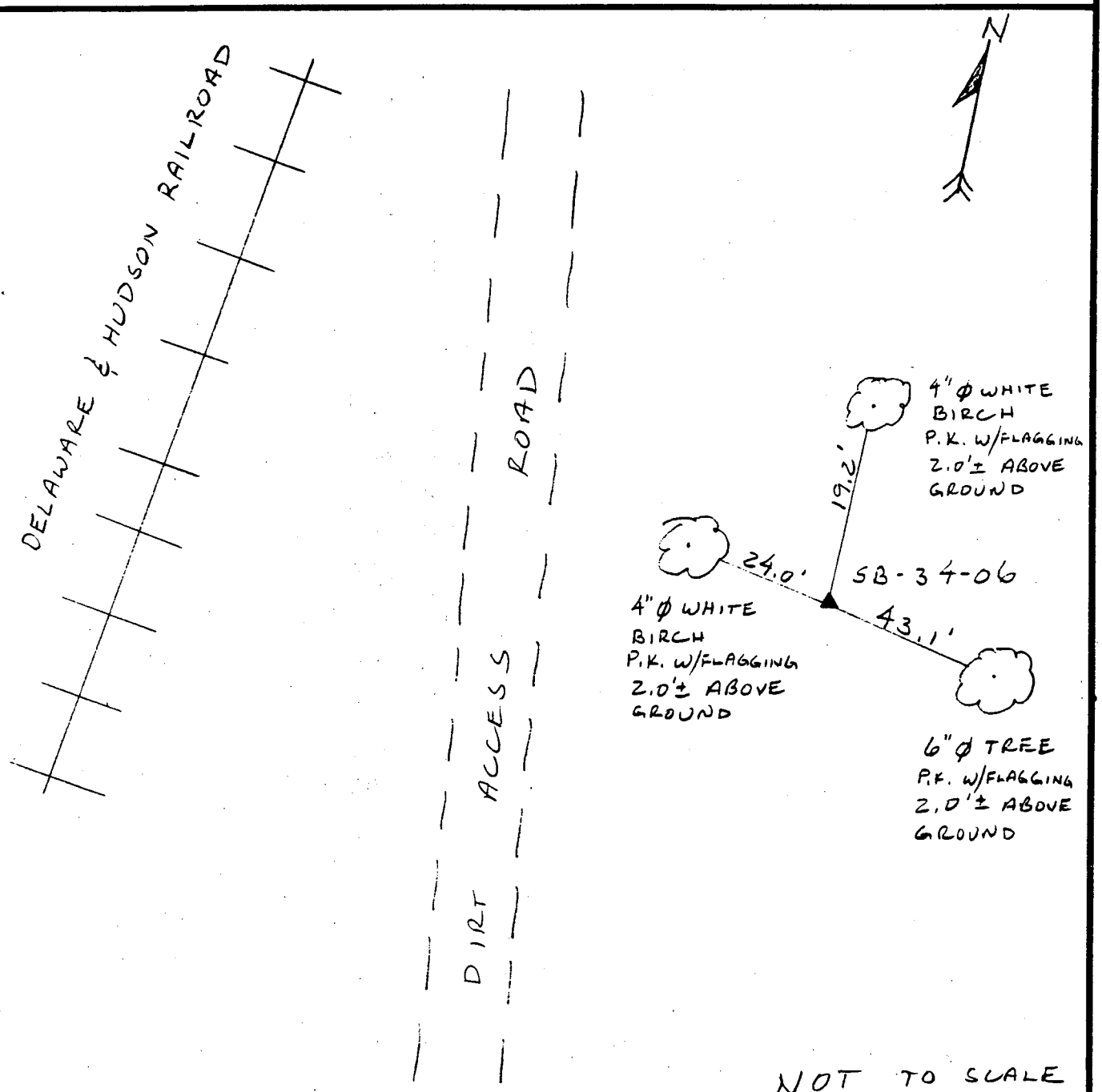
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690545.150
EASTING : 728986.236
GROUND ELEVATION : 147.53
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-06
SITE I.D. SS-034



POSITION RELATIVE TO EXISTING FEATURES

A-5429

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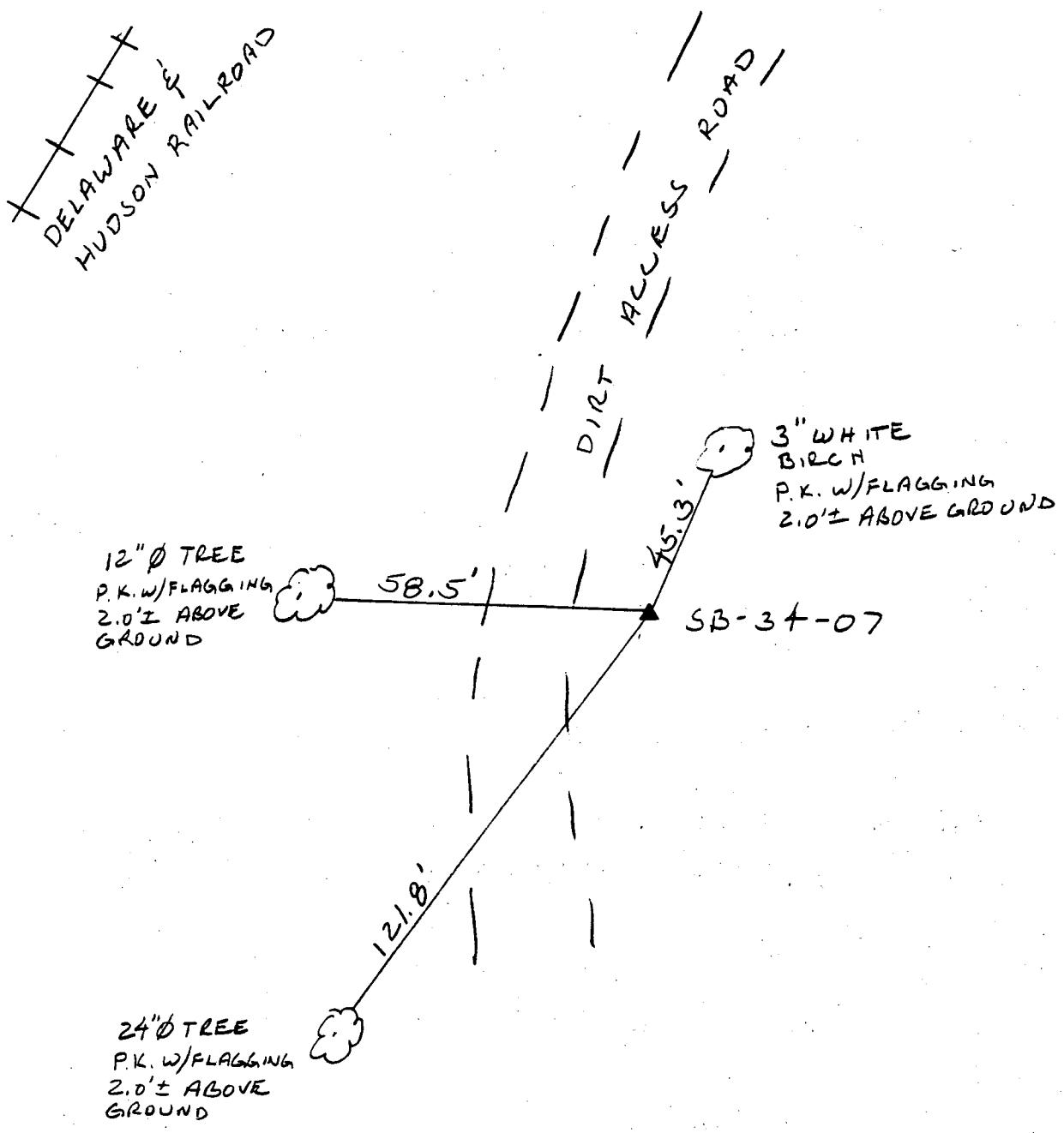
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690436.122
EASTING : 728957.124
GROUND ELEVATION : 147.78
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-07
SITE I.D. SS-034



NOT TO SCALE

POSITION RELATIVE TO EXISTING FEATURES

A-5429

URS
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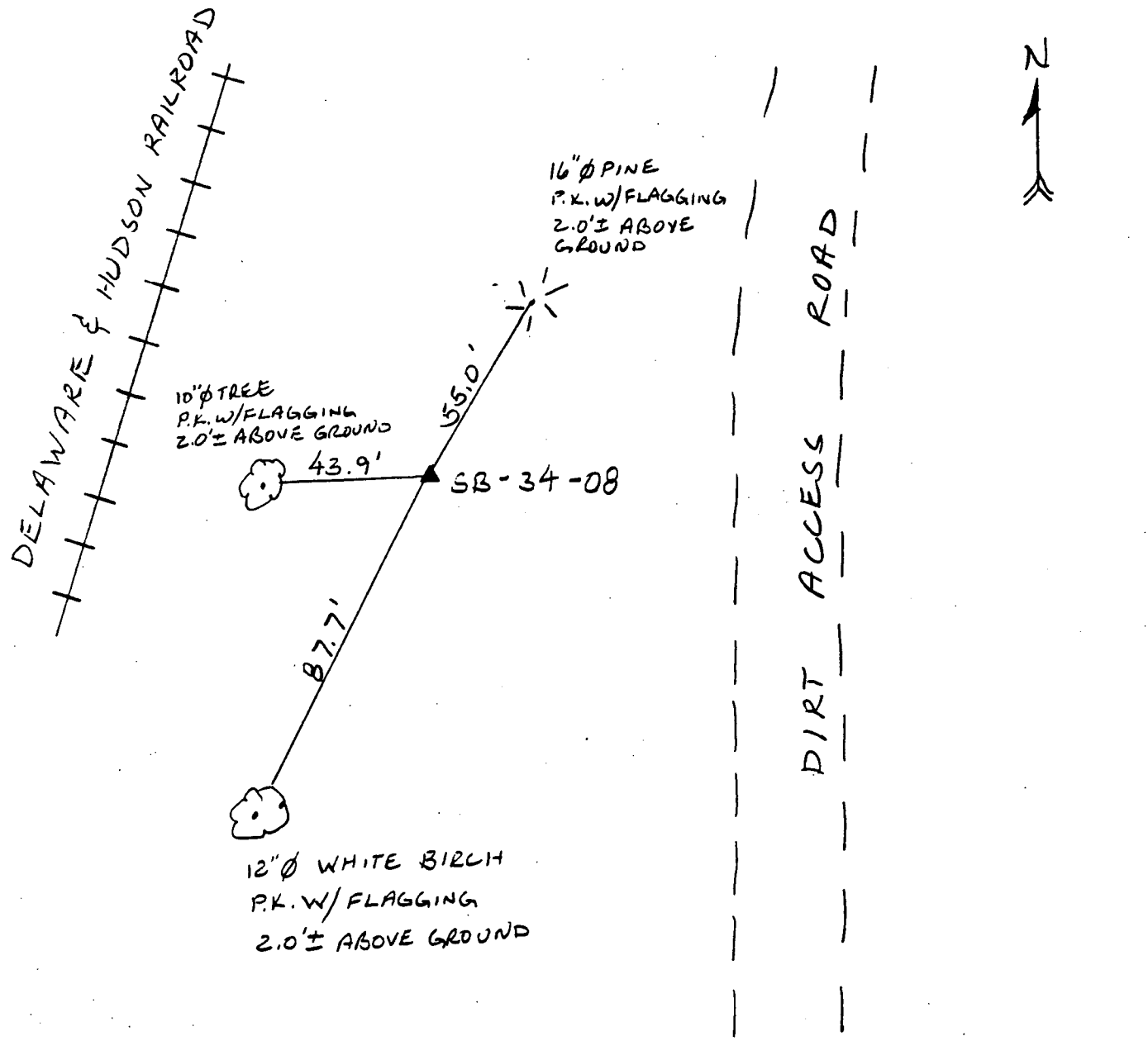
SUBSURFACE BORING LOCATION SHEET

NORTHING : 1690204.802
EASTING : 728924.372
GROUND ELEVATION : 146.55
HORIZONTAL DATUM : NAD 83
VERTICAL DATUM : NGVD 29

BORING I.D. SB-34-08
SITE I.D. SS-034



POSITION RELATIVE TO EXISTING FEATURES

A-5429

Appendix G

Human Health Risk Assessment Tables

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

SAMPLE	Aluminum		
	CONC	RANK	RANK (Ties)
WB-MW-34-003-0	2.35E+03	9	9
WB-MW-34-001-0	7.54E+03	30	30
SB-34-02-0	5.11E+03	28	28
SB-34-04-0	3.02E+03	22	22
SB-34-05-0	2.11E+03	6	6
SB-34-06-0	2.59E+03	15	15
SB-34-07-0	9.51E+03	33	33
SB-34-08-0	2.84E+03	19	19
SS-BKD-001	2.89E+03	20	20
SS-BKD-002	8.51E+03	32	32
SS-BKD-003	2.76E+03	17	17
SS-BKD-004	2.39E+03	10	10
SS-BKD-005	2.94E+03	21	21
SS-BKD-006	2.78E+03	18	18
SS-BKD-007	3.03E+03	23	23
SS-BKD-008	2.57E+03	14	14
SS-BKD-009	3.05E+03	24	24
SS-BKD-010	3.22E+03	25	25
SS-BKD-011	4.32E+03	26	26
SS-BKD-012	1.74E+03	2	2
SS-BKD-013	2.22E+03	7	7
SS-BKD-014	2.31E+03	8	8
SS-BKD-015	2.41E+03	12	12
SS-BKD-016	2.61E+03	16	16
SS-BKD-017	2.40E+03	11	11
SS-BKD-018	1.97E+03	4	4
SS-BKD-019	1.88E+03	3	3
SS-BKD-020	5.99E+03	29	29
SS-BKD-021	2.49E+03	13	13
SS-BKD-022	1.99E+03	5	5
SS-10-08	4.39E+03	27	27
SS-10-09	4.22E+02	1	1
SS-13-19	7.62E+03	31	31

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Aluminum
Compliance Data (n)	8
Background Data (m)	25
Mean Ÿ¹	4383.75
Mean Ÿ²	3155.68
Std. Deviation S¹	2765.46
Std. Deviation S²	1805.141
Sum of sample ranks R¹	162
Sum of sample ranks R²	399
Wilcoxon Statistic W	126
Expected Value E(W)	100
Std. Dev. SD(W)	23.8048
Std. Dev. (Ties) SD*(W)	23.8048
Approximate Z-score Z:	1.071
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

¹ - Onsite

² - Background

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cadmium			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	5.00E-01	1	1	16.5
WB-MW-34-001-0	1.80E+00	34		34
SB-34-02-0	5.00E-01	1	1	16.5
SB-34-04-0	5.00E-01	1	1	16.5
SB-34-05-0	5.00E-01	1	1	16.5
SB-34-06-0	5.00E-01	1	1	16.5
SB-34-07-0	5.00E-01	1	1	16.5
SB-34-08-0	5.00E-01	1	1	16.5
SS-BKD-001	5.00E-01	1	1	16.5
SS-BKD-002	5.00E-01	1	1	16.5
SS-BKD-003	5.00E-01	1	1	16.5
SS-BKD-004	5.00E-01	1	1	16.5
SS-BKD-005	5.00E-01	1	1	16.5
SS-BKD-006	5.00E-01	1	1	16.5
SS-BKD-007	5.00E-01	1	1	16.5
SS-BKD-008	5.00E-01	1	1	16.5
SS-BKD-009	5.00E-01	1	1	16.5
SS-BKD-010	5.00E-01	1	1	16.5
SS-BKD-011	5.00E-01	1	1	16.5
SS-BKD-012	5.00E-01	1	1	16.5
SS-BKD-013	5.00E-01	1	1	16.5
SS-BKD-014	5.00E-01	1	1	16.5
SS-BKD-015	5.00E-01	1	1	16.5
SS-BKD-016	5.00E-01	1	1	16.5
SS-BKD-017	5.00E-01	1	1	16.5
SS-BKD-018	5.00E-01	1	1	16.5
SS-BKD-019	5.00E-01	1	1	16.5
SS-BKD-020	5.00E-01	1	1	16.5
SS-BKD-021	5.00E-01	1	1	16.5
SS-BKD-022	5.00E-01	1	1	16.5
SS-04-029	5.00E-01	1	1	16.5
SS-10-08	1.30E+00	33		33
SS-10-09	5.00E-01	1	1	16.5
SS-13-19	5.00E-01	1	1	16.5

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cadmium
Compliance Data (n)	8
Background Data (m)	26
Mean Ÿ¹	0.663
Mean Ÿ²	0.531
Std. Deviation S¹	0.46
Std. Deviation S²	0.157
Sum of sample ranks R¹	149.5
Sum of sample ranks R²	445.5
Wilcoxon Statistic W	113.5
Expected Value E(W)	104
Std. Dev. SD(W)	24.6306
Std. Dev. (Ties) SD*(W)	10.0469
Approximate Z-score Z:	0.896
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

¹ - Onsite

² - Background

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cobalt			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	1.80E+00	5		5
WB-MW-34-001-0	8.85E+00	31		31
SB-34-02-0	3.40E+00	21		21
SB-34-04-0	2.40E+00	8	1	10
SB-34-05-0	2.40E+00	8	1	10
SB-34-06-0	2.80E+00	18		18
SB-34-07-0	1.01E+01	33		33
SB-34-08-0	2.20E+00	6		6
SS-BKD-001	6.25E+00	29		29
SS-BKD-002	7.30E+00	30		30
SS-BKD-003	3.70E+00	22	3	22.5
SS-BKD-004	2.70E+00	16	2	16.5
SS-BKD-005	9.20E+00	32		32
SS-BKD-006	2.30E+00	7		7
SS-BKD-007	3.70E+00	22	3	22.5
SS-BKD-008	2.40E+00	8	1	10
SS-BKD-009	3.90E+00	25		25
SS-BKD-010	2.60E+00	15		15
SS-BKD-011	2.70E+00	16	2	16.5
SS-BKD-012	1.60E+00	4		4
SS-BKD-013	5.30E+00	28		28
SS-BKD-014	3.30E+00	20		20
SS-BKD-015	2.40E+00	8	1	10
SS-BKD-016	2.45E+00	13		13
SS-BKD-017	2.40E+00	8	1	10
SS-BKD-018	3.10E+00	19		19
SS-BKD-019	1.30E+00	2		2
SS-BKD-020	3.80E+00	24		24
SS-BKD-021	5.00E+00	26	4	26.5
SS-BKD-022	9.10E-01	1		1
SS-10-08	2.50E+00	14		14
SS-10-09	5.00E+00	26	4	26.5
SS-13-19	1.50E+00	3		3

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cobalt
Compliance Data (n)	8
Background Data (m)	25
Mean Ÿ¹	4.244
Mean Ÿ²	3.492
Std. Deviation S¹	3.279
Std. Deviation S²	1.949
Sum of sample ranks R¹	134
Sum of sample ranks R²	427
Wilcoxon Statistic W	98
Expected Value E(W)	100
Std. Dev. SD(W)	23.8048
Std. Dev. (Ties) SD^(W)	23.7590
Approximate Z-score Z:	-0.105
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

¹ - Onsite

² - Background

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Nickel			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	3.40E+00	3		3
WB-MW-34-001-0	1.57E+01	32		32
SB-34-02-0	7.10E+00	25		25
SB-34-04-0	3.50E+00	4		4
SB-34-05-0	3.90E+00	5		5
SB-34-06-0	3.30E+00	2		2
SB-34-07-0	1.72E+01	33		33
SB-34-08-0	2.30E+00	1		1
SS-BKD-001	7.00E+00	24		24
SS-BKD-002	1.29E+01	31		31
SS-BKD-003	4.30E+00	12		12
SS-BKD-004	4.20E+00	11		11
SS-BKD-005	1.15E+01	30		30
SS-BKD-006	4.40E+00	13	3	13.5
SS-BKD-007	7.50E+00	26		26
SS-BKD-008	4.60E+00	15		15
SS-BKD-009	6.20E+00	23		23
SS-BKD-010	1.03E+01	27		27
SS-BKD-011	1.07E+01	28		28
SS-BKD-012	4.40E+00	13	3	13.5
SS-BKD-013	5.90E+00	21	5	21.5
SS-BKD-014	5.00E+00	16		16
SS-BKD-015	5.50E+00	18	4	18.5
SS-BKD-016	5.20E+00	17		17
SS-BKD-017	5.50E+00	18	4	18.5
SS-BKD-018	5.90E+00	21	5	21.5
SS-BKD-019	4.10E+00	9	2	9.5
SS-BKD-020	5.80E+00	20		20
SS-BKD-021	4.00E+00	6	1	7
SS-BKD-022	4.00E+00	6	1	7
SS-10-08	1.12E+01	29		29
SS-10-09	4.00E+00	6	1	7
SS-13-19	4.10E+00	9	2	9.5

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Nickel
Compliance Data (n)	8
Background Data (m)	25
Mean Ÿ¹	7.05
Mean Ÿ²	6.328
Std. Deviation S¹	5.98
Std. Deviation S²	2.744
Sum of sample ranks R¹	105
Sum of sample ranks R²	456
Wilcoxon Statistic W	69
Expected Value E(W)	100
Std. Dev. SD(W)	23.8048
Std. Dev. (Ties) SD*(W)	23.7888
Approximate Z-score Z:	-1.324
Significance Level Å	0.05
ZÅ	1.6449
Potential Concern	NO

NOTES:
¹ - Onsite
² - Background

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Zinc			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	1.66E+01	9		9
SB-34-02-0	2.22E+01	14		14
SB-34-04-0	4.08E+01	26		26
SB-34-05-0	2.02E+01	13		13
SB-34-06-0	2.62E+01	19		19
SB-34-07-0	6.43E+01	31		31
SB-34-08-0	3.66E+01	24		24
SS-BKD-001	1.70E+01	10		10
SS-BKD-002	5.62E+01	30		30
SS-BKD-003	1.18E+01	4		4
SS-BKD-004	2.78E+01	20		20
SS-BKD-005	3.06E+01	21		21
SS-BKD-006	6.44E+01	32		32
SS-BKD-007	2.30E+01	15		15
SS-BKD-008	1.45E+01	7		7
SS-BKD-009	3.91E+01	25		25
SS-BKD-010	2.54E+01	16		16
SS-BKD-011	3.30E+01	22		22
SS-BKD-012	1.60E+01	8		8
SS-BKD-013	1.11E+01	2		2
SS-BKD-014	1.23E+01	5	1	5.5
SS-BKD-015	2.59E+01	18		18
SS-BKD-016	3.56E+01	23		23
SS-BKD-017	5.37E+01	29		29
SS-BKD-018	4.25E+01	27		27
SS-BKD-019	1.10E+01	1		1
SS-BKD-020	2.55E+01	17		17
SS-BKD-021	1.77E+01	11		11
SS-BKD-022	1.23E+01	5	1	5.5
SS-10-08	4.87E+01	28		28
SS-10-09	1.14E+01	3		3
SS-13-19	1.84E+01	12		12

TABLE G-1

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SURFACE SOIL
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Zinc
Compliance Data (n)	7
Background Data (m)	25
Mean Ÿ[1]	32.414
Mean Ÿ[2]	27.394
Std. Deviation S[1]	16.567
Std. Deviation S[2]	15.7
Sum of sample ranks R[1]	136
Sum of sample ranks R[2]	392
Wilcoxon Statistic W	108
Expected Value E(W)	87.5
Std. Dev. SD(W)	21.9374
Std. Dev. (Ties) SD*(W)	21.9354
Approximate Z-score Z:	0.912
Significance Level Ā	0.05
ZĀ	1.6449
Potential Concern	NO

NOTES:

[1] - Onsite

[2] - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Aluminum		
SAMPLE	CONC	RANK	RANK (Ties)
WB-MW-34-003-0	2.35E+03	9	9
WB-MW-34-003-5	2.63E+04	35	35
WB-MW-34-001-0	7.54E+03	30	30
WB-MW-34-001-4	1.30E+04	34	34
SB-34-02-0	5.11E+03	28	28
SB-34-04-0	3.02E+03	22	22
SB-34-05-0	2.11E+03	6	6
SB-34-06-0	2.59E+03	15	15
SB-34-07-0	9.51E+03	33	33
SB-34-08-0	2.84E+03	19	19
SS-BKD-001	2.89E+03	20	20
SS-BKD-002	8.51E+03	32	32
SS-BKD-003	2.76E+03	17	17
SS-BKD-004	2.39E+03	10	10
SS-BKD-005	2.94E+03	21	21
SS-BKD-006	2.78E+03	18	18
SS-BKD-007	3.03E+03	23	23
SS-BKD-008	2.57E+03	14	14
SS-BKD-009	3.05E+03	24	24
SS-BKD-010	3.22E+03	25	25
SS-BKD-011	4.32E+03	26	26
SS-BKD-012	1.74E+03	2	2
SS-BKD-013	2.22E+03	7	7
SS-BKD-014	2.31E+03	8	8
SS-BKD-015	2.41E+03	12	12
SS-BKD-016	2.61E+03	16	16
SS-BKD-017	2.40E+03	11	11
SS-BKD-018	1.97E+03	4	4
SS-BKD-019	1.88E+03	3	3
SS-BKD-020	5.99E+03	29	29
SS-BKD-021	2.49E+03	13	13
SS-BKD-022	1.99E+03	5	5
SS-10-08	4.39E+03	27	27
SS-10-09	4.22E+02	1	1
SS-13-19	7.62E+03	31	31

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Aluminum
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	7437
Mean Ÿ²	3155.68
Std. Deviation S¹	7563.603
Std. Deviation S²	1805.141
Sum of sample ranks R¹	231
Sum of sample ranks R²	399
Wilcoxon Statistic W	176
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SD^(W)	27.3861
Approximate Z-score Z:	1.844
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	YES

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

SAMPLE	Barium		
	CONC	RANK	RANK (Ties)
WB-MW-34-003-0	1.26E+01	6	6
WB-MW-34-003-5	2.82E+02	36	36
WB-MW-34-001-0	5.90E+01	30	30
WB-MW-34-001-4	1.23E+02	34	34
SB-34-02-0	3.23E+01	27	27
SB-34-04-0	1.88E+01	17	17
SB-34-05-0	1.37E+01	10	10
SB-34-06-0	1.20E+01	4	4
SB-34-07-0	7.93E+01	33	33
SB-34-08-0	1.93E+01	18	18
SS-BKD-001	2.26E+01	21	21
SS-BKD-002	7.23E+01	32	32
SS-BKD-003	1.59E+01	15	15
SS-BKD-004	1.46E+01	11	11
SS-BKD-005	3.12E+01	26	26
SS-BKD-006	1.79E+01	16	16
SS-BKD-007	1.52E+01	13	13
SS-BKD-008	1.29E+02	35	35
SS-BKD-009	6.75E+01	31	31
SS-BKD-010	3.80E+01	28	28
SS-BKD-011	4.41E+01	29	29
SS-BKD-012	1.23E+01	5	5
SS-BKD-013	1.28E+01	7	7
SS-BKD-014	1.34E+01	8	8
SS-BKD-015	1.35E+01	9	9
SS-BKD-016	1.51E+01	12	12
SS-BKD-017	1.54E+01	14	14
SS-BKD-018	1.97E+01	19	19
SS-BKD-019	1.08E+01	3	3
SS-BKD-020	2.83E+01	25	25
SS-BKD-021	6.60E+00	1	1
SS-BKD-022	2.14E+01	20	20
SS-04-029	2.29E+01	22	22
SS-10-08	2.55E+01	23	23
SS-10-09	7.50E+00	2	2
SS-13-19	2.71E+01	24	24

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Barium
Compliance Data (n)	10
Background Data (m)	26
Mean Ÿ¹	65.2
Mean Ÿ²	27.712
Std. Deviation S¹	84.44
Std. Deviation S²	26.274
Sum of sample ranks R¹	215
Sum of sample ranks R²	451
Wilcoxon Statistic W	160
Expected Value E(W)	130
Std. Dev. SD(W)	28.3137
Std. Dev. (Ties) SD*(W)	28.3137
Approximate Z-score Z:	1.042
Significance Level Å	0.05
ZÅ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Beryllium			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	1.20E-01	5	2	6
WB-MW-34-003-5	1.20E+00	35		35
WB-MW-34-001-0	3.80E-01	27		27
WB-MW-34-001-4	6.40E-01	33		33
SB-34-02-0	2.20E-01	17		17
SB-34-04-0	5.00E-01	29	6	30.5
SB-34-05-0	1.10E-01	3	1	3.5
SB-34-06-0	1.20E-01	5	2	6
SB-34-07-0	3.60E-01	26		26
SB-34-08-0	5.00E-02	1		1
SS-BKD-001	2.65E-01	21		21
SS-BKD-002	4.80E-01	28		28
SS-BKD-003	2.50E-01	20		20
SS-BKD-004	1.30E-01	8		8
SS-BKD-005	3.50E-01	25		25
SS-BKD-006	1.50E-01	12		12
SS-BKD-007	1.80E-01	15		15
SS-BKD-008	1.40E-01	10	3	10.5
SS-BKD-009	2.30E-01	18	5	18.5
SS-BKD-010	3.20E-01	24		24
SS-BKD-011	3.10E-01	23		23
SS-BKD-012	1.20E-01	5	2	6
SS-BKD-013	2.30E-01	18	5	18.5
SS-BKD-014	1.60E-01	13	4	13.5
SS-BKD-015	1.10E-01	3	1	3.5
SS-BKD-016	1.35E-01	9		9
SS-BKD-017	1.90E-01	16		16
SS-BKD-018	1.40E-01	10	3	10.5
SS-BKD-019	7.00E-02	2		2
SS-BKD-020	1.60E-01	13	4	13.5
SS-BKD-021	5.00E-01	29	6	30.5
SS-BKD-022	5.00E-01	29	6	30.5
SS-10-08	7.40E-01	34		34
SS-10-09	5.00E-01	29	6	30.5
SS-13-19	2.80E-01	22		22

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Beryllium
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	0.37
Mean Ÿ²	0.266
Std. Deviation S¹	0.349
Std. Deviation S²	0.165
Sum of sample ranks R¹	185
Sum of sample ranks R²	445
Wilcoxon Statistic W	130
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SDˆ(W)	27.3516
Approximate Z-score Z:	0.165
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cadmium			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	5.00E-01	1	1	16.5
WB-MW-34-003-5	1.50E+00	34		34
WB-MW-34-001-0	1.80E+00	35	2	35.5
WB-MW-34-001-4	1.80E+00	35	2	35.5
SB-34-02-0	5.00E-01	1	1	16.5
SB-34-04-0	5.00E-01	1	1	16.5
SB-34-05-0	5.00E-01	1	1	16.5
SB-34-06-0	5.00E-01	1	1	16.5
SB-34-07-0	5.00E-01	1	1	16.5
SB-34-08-0	5.00E-01	1	1	16.5
SS-BKD-001	5.00E-01	1	1	16.5
SS-BKD-002	5.00E-01	1	1	16.5
SS-BKD-003	5.00E-01	1	1	16.5
SS-BKD-004	5.00E-01	1	1	16.5
SS-BKD-005	5.00E-01	1	1	16.5
SS-BKD-006	5.00E-01	1	1	16.5
SS-BKD-007	5.00E-01	1	1	16.5
SS-BKD-008	5.00E-01	1	1	16.5
SS-BKD-009	5.00E-01	1	1	16.5
SS-BKD-010	5.00E-01	1	1	16.5
SS-BKD-011	5.00E-01	1	1	16.5
SS-BKD-012	5.00E-01	1	1	16.5
SS-BKD-013	5.00E-01	1	1	16.5
SS-BKD-014	5.00E-01	1	1	16.5
SS-BKD-015	5.00E-01	1	1	16.5
SS-BKD-016	5.00E-01	1	1	16.5
SS-BKD-017	5.00E-01	1	1	16.5
SS-BKD-018	5.00E-01	1	1	16.5
SS-BKD-019	5.00E-01	1	1	16.5
SS-BKD-020	5.00E-01	1	1	16.5
SS-BKD-021	5.00E-01	1	1	16.5
SS-BKD-022	5.00E-01	1	1	16.5
SS-04-029	5.00E-01	1	1	16.5
SS-10-08	1.30E+00	33		33
SS-10-09	5.00E-01	1	1	16.5
SS-13-19	5.00E-01	1	1	16.5

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cadmium
Compliance Data (n)	10
Background Data (m)	26
Mean Ÿ¹	0.86
Mean Ÿ²	0.531
Std. Deviation S¹	0.585
Std. Deviation S²	0.157
Sum of sample ranks R¹	220.5
Sum of sample ranks R²	445.5
Wilcoxon Statistic W	165.5
Expected Value E(W)	130
Std. Dev. SD(W)	28.3137
Std. Dev. (Ties) SD˜(W)	15.4481
Approximate Z-score Z:	2.266
Significance Level Ă	0.05
ZĂ	1.6449
Potential Concern	YES

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Chromium			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	3.80E+00	6		6
WB-MW-34-003-5	5.57E+01	36		36
WB-MW-34-001-0	1.76E+01	32		32
WB-MW-34-001-4	2.56E+01	35		35
SB-34-02-0	7.30E+00	21	1	21.5
SB-34-04-0	5.70E+00	14		14
SB-34-05-0	2.90E+00	4		4
SB-34-06-0	5.00E+00	10		10
SB-34-07-0	1.91E+01	33		33
SB-34-08-0	4.20E+00	7		7
SS-BKD-001	8.40E+00	25	2	25.5
SS-BKD-002	1.53E+01	31		31
SS-BKD-003	7.50E+00	23		23
SS-BKD-004	5.60E+00	13		13
SS-BKD-005	1.14E+01	28		28
SS-BKD-006	6.30E+00	17		17
SS-BKD-007	1.03E+01	27		27
SS-BKD-008	5.20E+00	12		12
SS-BKD-009	8.40E+00	25	2	25.5
SS-BKD-010	1.15E+01	29		29
SS-BKD-011	1.27E+01	30		30
SS-BKD-012	4.90E+00	9		9
SS-BKD-013	7.30E+00	21	1	21.5
SS-BKD-014	6.40E+00	18		18
SS-BKD-015	6.60E+00	19		19
SS-BKD-016	5.15E+00	11		11
SS-BKD-017	6.80E+00	20		20
SS-BKD-018	5.90E+00	15		15
SS-BKD-019	3.40E+00	5		5
SS-BKD-020	6.10E+00	16		16
SS-BKD-021	2.30E+00	2		2
SS-BKD-022	2.50E+00	3		3
SS-04-029	4.70E+00	8		8
SS-10-08	1.95E+01	34		34
SS-10-09	2.00E+00	1		1
SS-13-19	7.70E+00	24		24

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Chromium
Compliance Data (n)	10
Background Data (m)	26
Mean Ÿ¹	14.685
Mean Ÿ²	7.454
Std. Deviation S¹	16.416
Std. Deviation S²	4.04
Sum of sample ranks R¹	198.5
Sum of sample ranks R²	467.5
Wilcoxon Statistic W	143.5
Expected Value E(W)	130
Std. Dev. SD(W)	28.3137
Std. Dev. (Ties) SD*(W)	28.3101
Approximate Z-score Z:	0.459
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cobalt			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	1.80E+00	5		5
WB-MW-34-003-5	2.74E+01	35		35
WB-MW-34-001-0	8.85E+00	31		31
WB-MW-34-001-4	1.72E+01	34		34
SB-34-02-0	3.40E+00	21		21
SB-34-04-0	2.40E+00	8	1	10
SB-34-05-0	2.40E+00	8	1	10
SB-34-06-0	2.80E+00	18		18
SB-34-07-0	1.01E+01	33		33
SB-34-08-0	2.20E+00	6		6
SS-BKD-001	6.25E+00	29		29
SS-BKD-002	7.30E+00	30		30
SS-BKD-003	3.70E+00	22	3	22.5
SS-BKD-004	2.70E+00	16	2	16.5
SS-BKD-005	9.20E+00	32		32
SS-BKD-006	2.30E+00	7		7
SS-BKD-007	3.70E+00	22	3	22.5
SS-BKD-008	2.40E+00	8	1	10
SS-BKD-009	3.90E+00	25		25
SS-BKD-010	2.60E+00	15		15
SS-BKD-011	2.70E+00	16	2	16.5
SS-BKD-012	1.60E+00	4		4
SS-BKD-013	5.30E+00	28		28
SS-BKD-014	3.30E+00	20		20
SS-BKD-015	2.40E+00	8	1	10
SS-BKD-016	2.45E+00	13		13
SS-BKD-017	2.40E+00	8	1	10
SS-BKD-018	3.10E+00	19		19
SS-BKD-019	1.30E+00	2		2
SS-BKD-020	3.80E+00	24		24
SS-BKD-021	5.00E+00	26	4	26.5
SS-BKD-022	9.10E-01	1		1
SS-10-08	2.50E+00	14		14
SS-10-09	5.00E+00	26	4	26.5
SS-13-19	1.50E+00	3		3

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Cobalt
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	7.855
Mean Ÿ²	3.492
Std. Deviation S¹	8.491
Std. Deviation S²	1.949
Sum of sample ranks R¹	203
Sum of sample ranks R²	427
Wilcoxon Statistic W	148
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SD*(W)	27.3420
Approximate Z-score Z:	0.823
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Iron		
SAMPLE	CONC	RANK	RANK (Ties)
WB-MW-34-003-0	4.46E+03	4	4
WB-MW-34-003-5	4.08E+04	35	35
WB-MW-34-001-0	1.55E+04	28	28
WB-MW-34-001-4	2.48E+04	33	33
SB-34-02-0	7.77E+03	19	19
SB-34-04-0	4.48E+03	5	5
SB-34-05-0	5.65E+03	9	9
SB-34-06-0	8.53E+03	21	21
SB-34-07-0	1.57E+04	30	30
SB-34-08-0	4.51E+03	7	7
SS-BKD-001	2.30E+04	31	31
SS-BKD-002	1.29E+04	27	27
SS-BKD-003	1.28E+04	26	26
SS-BKD-004	7.62E+03	18	18
SS-BKD-005	3.67E+04	34	34
SS-BKD-006	6.14E+03	12	12
SS-BKD-007	1.07E+04	24	24
SS-BKD-008	6.61E+03	14	14
SS-BKD-009	1.02E+04	23	23
SS-BKD-010	5.39E+03	8	8
SS-BKD-011	7.36E+03	17	17
SS-BKD-012	7.23E+03	16	16
SS-BKD-013	2.46E+04	32	32
SS-BKD-014	1.08E+04	25	25
SS-BKD-015	5.87E+03	11	11
SS-BKD-016	5.75E+03	10	10
SS-BKD-017	6.54E+03	13	13
SS-BKD-018	8.63E+03	22	22
SS-BKD-019	4.49E+03	6	6
SS-BKD-020	8.15E+03	20	20
SS-BKD-021	2.52E+03	2	2
SS-BKD-022	2.97E+03	3	3
SS-10-08	1.56E+04	29	29
SS-10-09	1.61E+03	1	1
SS-13-19	6.85E+03	15	15

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Iron
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	13215
Mean Ÿ²	10041.2
Std. Deviation S¹	11756.174
Std. Deviation S²	7853.276
Sum of sample ranks R¹	191
Sum of sample ranks R²	439
Wilcoxon Statistic W	136
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SD^(W)	27.3861
Approximate Z-score Z:	0.383
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Manganese			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	5.70E+01	9		9
WB-MW-34-003-5	6.80E+02	35		35
WB-MW-34-001-0	2.03E+02	29		29
WB-MW-34-001-4	4.56E+02	33		33
SB-34-02-0	5.92E+01	10		10
SB-34-04-0	3.62E+01	6		6
SB-34-05-0	9.56E+01	16		16
SB-34-06-0	3.12E+01	4		4
SB-34-07-0	3.10E+02	31		31
SB-34-08-0	3.52E+01	5		5
SS-BKD-001	3.62E+02	32		32
SS-BKD-002	1.62E+02	24		24
SS-BKD-003	1.80E+02	26		26
SS-BKD-004	1.02E+02	18		18
SS-BKD-005	4.74E+02	34		34
SS-BKD-006	9.10E+01	15		15
SS-BKD-007	1.23E+02	19		19
SS-BKD-008	9.71E+01	17		17
SS-BKD-009	1.44E+02	22	1	22.5
SS-BKD-010	7.18E+01	11		11
SS-BKD-011	1.87E+02	27		27
SS-BKD-012	5.57E+01	8		8
SS-BKD-013	7.95E+01	12		12
SS-BKD-014	1.41E+02	21		21
SS-BKD-015	1.32E+02	20		20
SS-BKD-016	1.73E+02	25		25
SS-BKD-017	1.44E+02	22	1	22.5
SS-BKD-018	2.77E+02	30		30
SS-BKD-019	8.15E+01	14		14
SS-BKD-020	8.08E+01	13		13
SS-BKD-021	2.17E+01	1		1
SS-BKD-022	3.09E+01	3		3
SS-10-08	1.91E+02	28		28
SS-10-09	2.45E+01	2		2
SS-13-19	5.50E+01	7		7

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Manganese
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	196.34
Mean Ÿ²	139.22
Std. Deviation S¹	221.502
Std. Deviation S²	104.523
Sum of sample ranks R¹	178
Sum of sample ranks R²	452
Wilcoxon Statistic W	123
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SD*(W)	27.3842
Approximate Z-score Z:	-0.091
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Nickel			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	3.40E+00	3		3
WB-MW-34-003-5	5.09E+01	35		35
WB-MW-34-001-0	1.57E+01	32		32
WB-MW-34-001-4	2.76E+01	34		34
SB-34-02-0	7.10E+00	25		25
SB-34-04-0	3.50E+00	4		4
SB-34-05-0	3.90E+00	5		5
SB-34-06-0	3.30E+00	2		2
SB-34-07-0	1.72E+01	33		33
SB-34-08-0	2.30E+00	1		1
SS-BKD-001	7.00E+00	24		24
SS-BKD-002	1.29E+01	31		31
SS-BKD-003	4.30E+00	12		12
SS-BKD-004	4.20E+00	11		11
SS-BKD-005	1.15E+01	30		30
SS-BKD-006	4.40E+00	13	2	13.5
SS-BKD-007	7.50E+00	26		26
SS-BKD-008	4.60E+00	15		15
SS-BKD-009	6.20E+00	23		23
SS-BKD-010	1.03E+01	27		27
SS-BKD-011	1.07E+01	28		28
SS-BKD-012	4.40E+00	13	2	13.5
SS-BKD-013	5.90E+00	21	3	21.5
SS-BKD-014	5.00E+00	16		16
SS-BKD-015	5.50E+00	18		19
SS-BKD-016	5.20E+00	17		17
SS-BKD-017	5.50E+00	18		18
SS-BKD-018	5.90E+00	21	3	21.5
SS-BKD-019	4.10E+00	9		9
SS-BKD-020	5.80E+00	20		20
SS-BKD-021	4.00E+00	6	1	7
SS-BKD-022	4.00E+00	6	1	7
SS-10-08	1.12E+01	29		29
SS-10-09	4.00E+00	6	1	7
SS-13-19	4.10E+00	9		10

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Nickel
Compliance Data (n)	10
Background Data (m)	25
Mean Ÿ¹	13.49
Mean Ÿ²	6.328
Std. Deviation S¹	15.566
Std. Deviation S²	2.744
Sum of sample ranks R¹	174
Sum of sample ranks R²	456
Wilcoxon Statistic W	119
Expected Value E(W)	125
Std. Dev. SD(W)	27.3861
Std. Dev. (Ties) SD*(W)	27.3746
Approximate Z-score Z:	-0.237
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Selenium			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	5.00E-01	1	1	11.5
WB-MW-34-003-5	1.70E+00	26		26
WB-MW-34-001-0	8.20E-01	23		23
WB-MW-34-001-4	5.00E-01	1	1	11.5
SB-34-02-0	5.00E-01	1	1	11.5
SB-34-04-0	5.00E-01	1	1	11.5
SB-34-05-0	5.00E-01	1	1	11.5
SB-34-06-0	5.00E-01	1	1	11.5
SB-34-07-0	1.30E+00	24		24
SB-34-08-0	5.00E-01	1	1	11.5
SS-BKD-011	5.00E-01	1	1	11.5
SS-BKD-012	5.00E-01	1	1	11.5
SS-BKD-013	5.00E-01	1	1	11.5
SS-BKD-014	5.00E-01	1	1	11.5
SS-BKD-015	5.00E-01	1	1	11.5
SS-BKD-016	5.00E-01	1	1	11.5
SS-BKD-017	5.00E-01	1	1	11.5
SS-BKD-018	5.00E-01	1	1	11.5
SS-BKD-019	5.00E-01	1	1	11.5
SS-BKD-020	5.00E-01	1	1	11.5
SS-BKD-021	5.00E-01	1	1	11.5
SS-BKD-022	5.00E-01	1	1	11.5
SS-04-029	5.00E-01	1	1	11.5
SS-10-08	1.65E+00	25		25
SS-10-09	5.00E-01	1	1	11.5
SS-13-19	5.00E-01	1	1	11.5

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Selenium
Compliance Data (n)	10
Background Data (m)	16
Mean Ÿ¹	0.732
Mean Ÿ²	0.572
Std. Deviation S¹	0.427
Std. Deviation S²	0.288
Sum of sample ranks R¹	153.5
Sum of sample ranks R²	197.5
Wilcoxon Statistic W	98.5
Expected Value E(W)	80
Std. Dev. SD(W)	18.9737
Std. Dev. (Ties) SD^(W)	11.9177
Approximate Z-score Z:	1.510
Significance Level Ã	0.05
ZÃ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Zinc			
SAMPLE	CONC	RANK	Groups of tied	RANK (Ties)
WB-MW-34-003-0	1.66E+01	9		9
WB-MW-34-003-5	1.10E+02	33		33
SB-34-02-0	2.22E+01	14		14
SB-34-04-0	4.08E+01	26		26
SB-34-05-0	2.02E+01	13		13
SB-34-06-0	2.62E+01	19		19
SB-34-07-0	6.43E+01	31		31
SB-34-08-0	3.66E+01	24		24
SS-BKD-001	1.70E+01	10		10
SS-BKD-002	5.62E+01	30		30
SS-BKD-003	1.18E+01	4		4
SS-BKD-004	2.78E+01	20		20
SS-BKD-005	3.06E+01	21		21
SS-BKD-006	6.44E+01	32		32
SS-BKD-007	2.30E+01	15		15
SS-BKD-008	1.45E+01	7		7
SS-BKD-009	3.91E+01	25		25
SS-BKD-010	2.54E+01	16		16
SS-BKD-011	3.30E+01	22		22
SS-BKD-012	1.60E+01	8		8
SS-BKD-013	1.11E+01	2		2
SS-BKD-014	1.23E+01	5	1	5.5
SS-BKD-015	2.59E+01	18		18
SS-BKD-016	3.56E+01	23		23
SS-BKD-017	5.37E+01	29		29
SS-BKD-018	4.25E+01	27		27
SS-BKD-019	1.10E+01	1		1
SS-BKD-020	2.55E+01	17		17
SS-BKD-021	1.77E+01	11		11
SS-BKD-022	1.23E+01	5	1	5.5
SS-10-08	4.87E+01	28		28
SS-10-09	1.14E+01	3		3
SS-13-19	1.84E+01	12		12

TABLE G-2

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
WILCOXON RANK-SUM TEST ONSITE SOIL*
VERSUS RESIDENTIAL BACKGROUND SOIL CONCENTRATIONS

	Zinc
Compliance Data (n)	8
Background Data (m)	25
Mean Ÿ¹	42.113
Mean Ÿ²	27.394
Std. Deviation S¹	31.428
Std. Deviation S²	15.7
Sum of sample ranks R¹	169
Sum of sample ranks R²	392
Wilcoxon Statistic W	133
Expected Value E(W)	100
Std. Dev. SD(W)	23.8048
Std. Dev. (Ties) SD˜(W)	23.8028
Approximate Z-score Z:	1.365
Significance Level Ă	0.05
ZĂ	1.6449
Potential Concern	NO

NOTES:

* - Soil consists of surface and subsurface soil.

¹ - Onsite

² - Background

TABLE G-3

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR CURRENT USE SCENARIO (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET

Sample I.D. / Parameter	WB-MW-34-003-0 (mg/kg)	WB-MW-34-001-0* (mg/kg)	SB-34-02-0 (mg/kg)	SB-34-04-0 (mg/kg)	SB-34-05-0 (mg/kg)	SB-34-06-0 (mg/kg)	SB-34-07-0 (mg/kg)	SB-34-08-0 (mg/kg)
Acetone	1.20E-02 ¥	3.00E-03 ¥	6.00E-03 ¥	1.50E-02 ¥ ¤	6.00E-03 ¥	5.50E-03	4.00E-03 ¥	1.30E-02 ¥
1,1,1-Trichloroethane	3.40E-02 ¥ ¤	6.00E-03	6.00E-03	5.50E-03	5.50E-03	5.50E-03	6.50E-03	5.50E-03
Diethylphthalate	2.10E-01	2.10E-01	2.00E-01	1.05E-01 ¥ ¤	1.80E-01	1.80E-01	2.10E-01	1.90E-01
Di-n-butylphthalate	2.10E-01	2.10E-01	2.00E-01	1.90E-01	1.20E-01 ¥ ¤	1.80E-01	2.10E-01	1.90E-01
Vanadium	6.40E+00 ¥	2.29E+01 ¥ ¤	1.38E+01 ¥	6.70E+00 ¥	7.40E+00 ¥	1.20E+01 ¥	2.25E+01 ¥	7.30E+00 ¥

NOTES:

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

TABLE G-3

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR CURRENT USE SCENARIO (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET

Sample I.D. Parameter	Skewness	Normally distributed?**	Arithmetic Mean[1]	Number of samples (n)	(n-1)	t(0.95)	Standard Deviation[1]	UL-95[1] Value	Maximum Conc.	**Exposure Conc.**
Acetone	0.57	YES	8.06E-03	8	7	1.895	4.55E-03	1.11E-02	1.50E-02	1.11E-02
1,1,1-Trichloroethane	2.82	NO	—	—	—	—	—	—	3.40E-02	—
Diethylphthalate	-2.12	NO	—	—	—	—	—	—	1.05E-01	—
Di-n-butylphthalate	-2.09	NO	—	—	—	—	—	—	1.20E-01	—
Vanadium	0.90	YES	1.24E+01	8	7	1.895	6.90E+00	1.70E+01	2.29E+01	1.70E+01

NOTES:

** - Skewness values between 1 and -1 indicate a normal distribution. If skewness values are not in this range, log (LN) transform original data and assume it is log-normally distributed.

[1] - Untransformed concentration

TABLE G-3

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR CURRENT USE SCENARIO (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET

Sample I.D. Parameter	WB-MW-34-003-0 (mg/kg)	WB-MW-34-001-0* (mg/kg)	SB-34-02-0 (mg/kg)	SB-34-04-0 (mg/kg)	SB-34-05-0 (mg/kg)	SB-34-06-0 (mg/kg)	SB-34-07-0 (mg/kg)	SB-34-08-0 (mg/kg)
Acetone	—	—	—	—	—	—	—	—
1,1,1-Trichloroethane	-3.38E+00	-5.12E+00	-5.12E+00	-5.20E+00	-5.20E+00	-5.20E+00	-5.04E+00	-5.20E+00
Diethylphthalate	-1.56E+00	-1.56E+00	-1.61E+00	-2.25E+00	-1.71E+00	-1.71E+00	-1.56E+00	-1.66E+00
Di-n-butylphthalate	-1.56E+00	-1.56E+00	-1.61E+00	-1.66E+00	-2.12E+00	-1.71E+00	-1.56E+00	-1.66E+00
Vanadium	—	—	—	—	—	—	—	—

NOTES:

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

TABLE G-3

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR CURRENT USE SCENARIO (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET

Sample I.D. Parameter	Arithmetic Mean[2]	Number of samples (n)	(n-1)	Standard Deviation[2]	H(0.95)	UL-95[2] Value	Maximum Conc.	**Exposure Conc.**
Acetone	—	—	—	—	—	—	1.50E-02	—
1,1,1-Trichloroethane	-4.93E+00	8	7	6.30E-01	2.634	1.65E-02	3.40E-02	1.65E-02
Diethylphthalate	-1.70E+00	8	7	2.31E-01	1.991	2.22E-01	1.05E-01	1.05E-01
Di-n-butylphthalate	-1.68E+00	8	7	1.87E-01	1.945	2.17E-01	1.20E-01	1.20E-01
Vanadium	—	—	—	—	—	—	2.29E+01	—

NOTES:

[2] - Log-transformed concentration

TABLE G-4

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR FUTURE USE SCENARIO* (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET

Sample I.D. / Parameter	WB-MW-34-003-0 (mg/kg)	WB-MW-34-003-5 (mg/kg)	WB-MW-34-001-0* (mg/kg)	WB-MW-34-001-4 (mg/kg)	SB-34-02-0 (mg/kg)	SB-34-04-0 (mg/kg)	SB-34-05-0 (mg/kg)	SB-34-06-0 (mg/kg)
Acetone	1.20E-02 ¥	1.50E-02 ¥ ¤	3.00E-03 ¥	5.50E-03	6.00E-03 ¥	1.50E-02 ¥ ¤	6.00E-03 ¥	5.50E-03
1,1,1-Trichloroethane	3.40E-02 ¥ ¤	2.60E-02 ¥	6.00E-03	5.50E-03	6.00E-03	5.50E-03	5.50E-03	5.50E-03
Diethylphthalate	2.10E-01	1.10E+00 ¥ ¤	2.10E-01	1.90E-01	2.00E-01	1.05E-01 ¥	1.80E-01	1.80E-01
Di-n-butylphthalate	2.10E-01	2.20E-01	2.10E-01	1.90E-01	2.00E-01	1.90E-01	1.20E-01 ¥ ¤	1.80E-01
Aluminum	2.35E+03 ¥	2.63E+04 ¥ ¤	7.54E+03 ¥	1.30E+04 ¥	5.11E+03 ¥	3.02E+03 ¥	2.11E+03 ¥	2.59E+03 ¥
Cadmium	5.00E-01	1.50E+00 ¥	1.80E+00 ¥ ¤	1.80E+00 ¥ ¤	5.00E-01	5.00E-01	5.00E-01	5.00E-01
Vanadium	6.40E+00 ¥	6.93E+01 ¥ ¤	2.29E+01 ¥	4.21E+01 ¥	1.38E+01 ¥	6.70E+00 ¥	7.40E+00 ¥	1.20E+01 ¥
Zinc	1.66E+01 ¥	1.10E+02 ¥ ¤	R	R	2.22E+01 ¥	4.08E+01 ¥	2.02E+01 ¥	2.62E+01 ¥

NOTES:

* - Soil consists of surface and subsurface soil.

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

R -The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE G-4

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR FUTURE USE SCENARIO* (UNTRANSFORMED CONCENTRATION)
CALCULATION WORKSHEET

Sample I.D. Parameter	SB-34-07-0 (mg/kg)	SB-34-08-0 (mg/kg)	Skewness	Normally distributed?**	Arithmetic Mean[1]	Number of samples (n)	(n-1)	t(0.95)	Standard Deviation[1]	UL-95[1] Value	Maximum Conc.	**Exposure Conc.**
Acetone	4.00E-03 ¥	1.30E-02 ¥	0.46	YES	8.50E-03	10	9	1.833	4.69E-03	1.12E-02	1.50E-02	1.12E-02
1,1,1-Trichloroethane	6.50E-03	5.50E-03	1.92	NO	—	—	—	—	—	—	3.40E-02	—
Diethylphthalate	2.10E-01	1.90E-01	3.09	NO	—	—	—	—	—	—	1.10E+00	—
Di-n-butylphthalate	2.10E-01	1.90E-01	-2.07	NO	—	—	—	—	—	—	1.20E-01	—
Aluminum	9.51E+03 ¥	2.84E+03 ¥	2.02	NO	—	—	—	—	—	—	2.63E+04	—
Cadmium	5.00E-01	5.00E-01	1.11	NO	—	—	—	—	—	—	1.80E+00	—
Vanadium	2.25E+01 ¥	7.30E+00 ¥	1.82	NO	—	—	—	—	—	—	6.93E+01	—
Zinc	6.43E+01 ¥	3.66E+01 ¥	1.51	NO	—	—	—	—	—	—	1.10E+02	—

NOTES:

* - Soil consists of surface and subsurface soil.

¥ - Concentration detected. When an analyte was not detected, one-half the sample quantitation limit was used to calculate the UL-95 value.

¤ -Maximum concentration detected

** - Skewness values between 1 and -1 indicate a normal distribution. If skewness values are not in this range, log (LN) transform original data and assume it is log-normally distributed.

[1] - Untransformed concentration

TABLE G-4

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR FUTURE USE SCENARIO* (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET

Sample I.D. / Parameter	WB-MW-34-003-0 (mg/kg)	WB-MW-34-003-5 (mg/kg)	WB-MW-34-001-0* (mg/kg)	WB-MW-34-001-4 (mg/kg)	SB-34-02-0 (mg/kg)	SB-34-04-0 (mg/kg)	SB-34-05-0 (mg/kg)	SB-34-06-0 (mg/kg)
Acetone	—	—	—	—	—	—	—	—
1,1,1-Trichloroethane	-3.38E+00	-3.65E+00	-5.12E+00	-5.20E+00	-5.12E+00	-5.20E+00	-5.20E+00	-5.20E+00
Diethylphthalate	-1.56E+00	9.53E-02	-1.56E+00	-1.66E+00	-1.61E+00	-2.25E+00	-1.71E+00	-1.71E+00
Di-n-butylphthalate	-1.56E+00	-1.51E+00	-1.56E+00	-1.66E+00	-1.61E+00	-1.66E+00	-2.12E+00	-1.71E+00
Aluminum	7.76E+00	1.02E+01	8.93E+00	9.47E+00	8.54E+00	8.01E+00	7.65E+00	7.86E+00
Cadmium	-6.93E-01	4.05E-01	5.88E-01	5.88E-01	-6.93E-01	-6.93E-01	-6.93E-01	-6.93E-01
Vanadium	1.86E+00	4.24E+00	3.13E+00	3.74E+00	2.62E+00	1.90E+00	2.00E+00	2.48E+00
Zinc	2.81E+00	4.70E+00	R	R	3.10E+00	3.71E+00	3.01E+00	3.27E+00

NOTES:

* - Soil consists of surface and subsurface soil.

** - Sample was analyzed in duplicate. Arithmetic mean of values was used when necessary.

R -The sample results were rejected due to serious deficiencies in the ability to meet holding time criteria and quality control criteria. The presence or absence of the analyte could not be verified.

TABLE G-4

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
EXPOSURE CONCENTRATIONS FOR FUTURE USE SCENARIO* (LOG-TRANSFORMED CONCENTRATIONS)
CALCULATION WORKSHEET

Sample I.D. Parameter	SB-34-07-0 (mg/kg)	SB-34-08-0 (mg/kg)	Arithmetic Mean²	Number of samples (n)	(n-1)	Standard Deviation²	H(0.95)	UL-95² Value	Maximum Conc.	**Exposure Conc.**
Acetone	—	—	—	—	—	—	—	—	1.50E-02	—
1,1,1-Trichloroethane	-5.04E+00	-5.20E+00	-4.83E+00	10	9	6.99E-01	2.532	1.84E-02	3.40E-02	1.84E-02
Diethylphthalate	-1.56E+00	-1.66E+00	-1.52E+00	10	9	6.03E-01	2.368	4.22E-01	1.10E+00	4.22E-01
Di-n-butylphthalate	-1.56E+00	-1.66E+00	-1.66E+00	10	9	1.73E-01	1.857	2.14E-01	1.20E-01	1.20E-01
Aluminum	9.16E+00	7.95E+00	8.55E+00	10	9	8.54E-01	2.806	1.66E+04	2.63E+04	1.66E+04
Cadmium	-6.93E-01	-6.93E-01	-3.27E-01	10	9	5.91E-01	2.353	1.37E+00	1.80E+00	1.37E+00
Vanadium	3.11E+00	1.99E+00	2.71E+00	10	9	8.30E-01	2.768	4.55E+01	6.93E+01	4.55E+01
Zinc	4.16E+00	3.60E+00	3.54E+00	8	7	6.39E-01	2.655	8.06E+01	1.10E+02	8.06E+01

NOTES:

* - Soil consists of surface and subsurface soil.

² - Log-transformed concentration

TABLE G-5

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
INGESTION OF CHEMICALS IN SURFACE SOIL - HAZARD INDEX
CURRENT-USE

CHEMICAL	CHEMICAL CONCENTRATION IN SOIL (CS) (mg/kg)	INTAKE (mg/kg-day) TRESPASSER		TOXICITY VALUE ORAL RfD (mg/kg-day)		HAZARD QUOTIENT (unitless) TRESPASSER	
		ADULT	TEENAGER	CHRONIC	SUBCHRONIC	ADULT	TEENAGER
Acetone	1.11E-02	3.39E-09	4.24E-09	1.00E-01	1.00E+00	3.39E-08	4.24E-09
1,1,1-Trichloroethane	1.65E-02	5.02E-09	6.28E-09	NV	NV	NV	NV
Diethylphthalate	1.05E-01	3.21E-08	4.01E-08	8.00E-01	8.00E+00	4.01E-08	5.01E-09
Di-n-butylphthalate	1.20E-01	3.66E-08	4.58E-08	1.00E-01	1.00E+00	3.66E-07	4.58E-08
Vanadium	1.70E+01	5.19E-06	6.48E-06	7.00E-03	7.00E-03	7.41E-04	9.26E-04
					TOTAL HAZARD INDEX	7E-04	9E-04

PARAMETER	SYMBOL	UNITS	TRESPASSER	
			ADULT	TEENAGER
Ingestion rate	IR	mg/day	100	100
Conversion factor	CF	kg/mg	1.00E-06	1.00E-06
Fraction ingested from contaminated source	FI	unitless	1	1
Exposure frequency	EF	days/year	78	78
Exposure duration	ED	years	30	6
Body weight	BW	kg	70	56
Averaging time	AT	days	10950	2190

NOTES:

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

TABLE G-6

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
INHALATION OF CARCINOGENIC CHEMICALS FROM FUGITIVE DUST* - CANCER RISK
FUTURE-USE

CHEMICAL	RESPIRABLE CONCENTRATION (CA) (mg/m^3)	INTAKE (mg/kg-day)	SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK (unitless)
		CONSTRUCTION WORKER	INHALATION	CONSTRUCTION WORKER
Cadmium	7.36E-07	6.42E-10	6.30E+00	4.04E-09

TOTAL CANCER RISK	4E-09

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER
Inhalation rate	IR	m^3/hr	3
Exposure time	ET	hours/day	8
Exposure frequency	EF	days/week	5
Exposure duration	ED	weeks	13
Body weight	BW	kg	70
Averaging time	AT	days	25550

NOTES:

* - Soil consists of surface and subsurface soil.

NV - No Value

EQUATIONS:

Intake = (CA × IR × ET × EF × ED) / (BW × AT)

Cancer Risk = (Intake) × (Slope Factor)

TABLE G-7

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
INGESTION OF CHEMICALS IN SOIL* - HAZARD INDEX
FUTURE-USE

CHEMICAL	CHEMICAL CONCENTRATION IN SOIL* (CS) (mg/kg)	INTAKE (mg/kg-day)			TOXICITY VALUE ORAL RfD (mg/kg-day)		HAZARD QUOTIENT (unitless)		
		CONSTRUCTION	RESIDENT				CONSTRUCTION	RESIDENT	
		WORKER	ADULT	CHILD	SUBCHRONIC	CHRONIC	WORKER	ADULT	CHILD
Acetone	1.12E-02	5.49E-08	7.90E-09	7.38E-08	1.00E+00	1.00E-01	5.49E-08	7.90E-08	7.38E-08
1,1,1-Trichloroethane	1.84E-02	8.99E-08	1.29E-08	1.21E-07	NV	NV	NV	NV	NV
Diethylphthalate	4.22E-01	2.07E-06	2.98E-07	2.78E-06	8.00E+00	8.00E-01	2.59E-07	3.72E-07	3.47E-07
Di-n-butylphthalate	1.20E-01	5.88E-07	8.45E-08	7.89E-07	1.00E+00	1.00E-01	5.88E-07	8.45E-07	7.89E-07
Aluminum	1.66E+04	8.11E-02	1.17E-02	1.09E-01	NV	NV	NV	NV	NV
Cadmium	1.37E+00	6.69E-06	9.62E-07	8.98E-06	1.00E-03	1.00E-03	6.69E-03	9.62E-04	8.98E-03
Vanadium	4.55E+01	2.23E-04	3.21E-05	2.99E-04	7.00E-03	7.00E-03	3.18E-02	4.58E-03	4.27E-02
Zinc	8.06E+01	3.95E-04	5.68E-05	5.30E-04	3.00E-01	3.00E-01	1.32E-03	1.89E-04	1.77E-03
						TOTAL HAZARD INDEX	**4E-02**	**6E-03**	**5E-02**

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER	RESIDENT ADULT	RESIDENT CHILD
Ingestion rate	IR	mg/day	480	100	200
Conversion factor	CF	kg/mg	1E-06	1E-06	1E-06
Fraction ingested from contaminated source	FI	unitless	1	1	1
Exposure frequency	EF	days/year**	5	180	180
Exposure duration	ED	years**	13	30	6
Body weight	BW	kg	70	70	15
Averaging time	AT	days	91	10950	2190

NOTES:

* - Soil consists of surface and subsurface soil.

** - Units for construction worker are days/week for EF and weeks for ED.

NV - No Value

EQUATIONS:

Intake = (CS × IR × CF × FI × EF × ED) / (BW × AT)

Hazard Quotient = (Intake) / (Toxicity Value)

TABLE G-8

SOUTH CLEAR ZONE (SS-034) - SITE INVESTIGATION
DERMAL CONTACT WITH CHEMICALS IN SOIL* - HAZARD INDEX
FUTURE-USE

CHEMICAL	CHEMICAL CONCENTRATION IN SOIL* (CS) (mg/kg)	ABSORPTION FACTOR (ABS) (unitless)	ABSORBED DOSE (mg/kg-day)			TOXICITY VALUE ORAL RfD (mg/kg-day)		HAZARD QUOTIENT (unitless)		
			CONSTRUCTION	RESIDENT				CONSTRUCTION	RESIDENT	
			WORKER	ADULT	CHILD	SUBCHRONIC	CHRONIC	WORKER	ADULT	CHILD
Acetone	1.12E-02	NV	NV	NV	NV	1.00E+00	1.00E-01	NV	NV	NV
1,1,1-Trichloroethane	1.84E-02	NV	NV	NV	NV	NV	NV	NV	NV	NV
Diethylphthalate	4.22E-01	NV	NV	NV	NV	8.00E+00	8.00E-01	NV	NV	NV
Di-n-butylphthalate	1.20E-01	NV	NV	NV	NV	1.00E+00	1.00E-01	NV	NV	NV
Aluminum	1.66E+04	NV	NV	NV	NV	NV	NV	NV	NV	NV
Cadmium	1.37E+00	0.01	4.35E-07	7.65E-07	1.58E-06	5.00E-05 [a]	5.00E-05 [a]	8.70E-03	1.53E-02	3.16E-02
Vanadium	4.55E+01	NV	NV	NV	NV	7.00E-03	7.00E-03	NV	NV	NV
Zinc	8.06E+01	NV	NV	NV	NV	3.00E-01	3.00E-01	NV	NV	NV
							TOTAL HAZARD INDEX	9E-03	2E-02	3E-02

PARAMETER	SYMBOL	UNITS	CONSTRUCTION WORKER	RESIDENT ADULT	RESIDENT CHILD
Conversion factor	CF	kg/mg	1.00E-06	1.00E-06	1.00E-06
Skin surface area available for contact	SA	cm^2/event	3120	7948	3520
Soil to skin adherence factor	AF	mg/cm^2	1.0	1.0	1.0
Exposure frequency	EF	events/year**	5	180	180
Exposure duration	ED	years**	13	30	6
Body weight	BW	kg	70	70	15
Averaging time	AT	days	91	10950	2190

NOTES:

* - Soil consists of surface and subsurface soil.

** - Units for construction worker are days/week for EF and weeks for ED.

[a] Toxicity value was adjusted to reflect 5% absorption efficiency.

NV - No Value

EQUATIONS:

Absorbed Dose = (CS × CF × SA × AF × ABS × EF × ED) / (BW × AT)

Hazard Quotient = (Absorbed Dose) / (Toxicity Value)

Appendix H

Fugitive Dust Model

PLATTSBURGH AIR FORCE BASE

FUGITIVE DUST MODEL

SITE SS-034 SOUTH CLEAR ZONE

SUMMARY

The *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites* (EPA/600/8-85/002, Feb. 1985) and EPA Manual *AP-42* Chapter 13.2 paragraphs 13.2.1, 13.2.2 and 13.2.3 dated 7/94, are used to estimate the rate of fugitive dust emission from Plattsburgh AFB Site SS-034. The *New York State Air Guide-1 Draft* (NYSDEC 1991) is used to estimate the Maximum Actual Annual Impact Concentration for an onsite receptor during future construction activities for residential development.

The Maximum Actual Annual Concentration (C_a) for an onsite receptor at the Plattsburgh AFB site SS-034 is estimated to be:

$$C_a = 53.86 \times 10^{-2} \alpha_{sub} \text{ mg/m}^3$$

where "α_{sub}" is the dimensionless concentration of the chemicals in the subsurface soils at the site. "α_{sub}" and "C_a" are contaminant specific.

1. Purpose

The purpose of this calculation is to estimate the ambient air concentration of contaminants from particulate emissions on site SS-034 during the construction of residential dwellings.

2. Methodology

The rate of fugitive dust emission is estimated using the *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites* (USEPA 1985) and *AP-42* Chapter 13 (USEPA 1994). Because the ambient air concentration model in these documents (hereafter referred to as the "manual") is applicable only for sites smaller than 300 ft. x 300 ft. and because SS-034 covers 168,100 square feet (approximately 410 ft. x 410 ft.), the methodology described in the *New York State Air Guide-1 Draft* was used to calculate the ambient air concentration using the emission rate determined by the method in the manual.

All tables and figures referred to in these calculations are from the manual. Copies of these illustrations are located in the reference section of this calculation.

3. Summary of Assumptions

a) The site is approximated as a square region (410 ft x 410 ft).

b) Large non-erodible particles are not present so u_{*_t} does not need to be corrected.

c) There is no building presently on the site and the site is covered with grass.

d) A 168,100 ft^2 area covering SS-034 is assumed for the future construction site. During construction, the site will be without any vegetation.

e) Earth moving operations are assumed to be batch drop operations. Corresponding assumptions are:

(i) backhoe loads are dropped from a height of 10 ft. above the ground
(ii) the capacity of the dumping device or bucket is 1.5 yd^3
(iii) the backhoe operates at 30 sec/load
(iv) each load weight 2 tons/yd^3
(v) 2 backhoes are used on the site

f) Construction vehicles are assumed to travel 10 km/hr, weigh 10 Mg, and have 5 wheels on average. Approximately 2 round trips/day are made by 10 vehicles making a 1 km round trip on the site.

g) Surface and subsurface soils have different contaminant concentrations ($\alpha_{surf} \neq \alpha_{sub}$).

h) No other sources contribute to SS-034 site contamination.

4. Calculation - Construction Activities

a) Likelihood of Wind Erosion

Visual inspection indicates that the site is covered mostly with grass and trees; therefore, significant wind erosion does not occur at present. However, this calculation models emissions from future construction activities which would involve the excavation of soil and the exposure of soil areas, as indicated on Figure 1, p. 11 of this calculation. The following calculations consider the construction scenario.

b) Type of Emission Model

In order to determine the type of emission model to use for the site, the threshold friction velocity of the soil particles on the site needs to be calculated.

(i) Surface Soil

From the grain size analyses (pp. 13-16 of this calculation)
Mode for surface soil = 0.65

From Figure 3-4, the Threshold Friction Velocity is
u_{*_t} = 55 cm/s (p. 19 of this calculation)

- It is assumed that large non-erodible particles are not present at the site, thus u_{*_t} does not need to be corrected.
- Because 55 cm/s < 75 cm/s, the "Unlimited Reservoir Model" will be utilized.

(ii) Subsurface Soil (for construction activities)

From the grain size analyses (pp. 13-16 of this calculation)
Mode for subsurface soil = 0.00625

From Figure 3-4, the Threshold Friction Velocity is
u_{*_t} = 25 cm/s (p. 19 of this calculation)

- It is assumed that large non-erodible particles are not present at the site, thus u_{*_t} does not need to be corrected.
- Because 25 cm/s < 75 cm/s the "Unlimited Reservoir Model" will be utilized.

c) Wind Erosion from Surfaces with Unlimited Erosion

(i) Find E_{10} (annual average emission rate) using Equation 4-4 in the manual (p. 24 of this calculation):

$$E_{10} = 0.036\ (1 - V) \left(\frac{[u]}{u_t}\right)^3 F(x)$$

Where

E_{10} = annual average emission rate (g/m^2 hr)
V = fraction of vegetated surface
u_t = threshold value of wind speed at 7m (m/s)
[u] = mean annual wind speed (from Table 4-1, pp. 20-21 of this calculation.)
x = $0.886\ u_t/[u]$
F(x) = function of x (plotted in Figure 4-3, p. 23 of this calculation)

- Rearrange Equation 4-3 to find u_t (Equation 4-3 in the manual, p. 25 of this calculation):

$$u(z) = \left(\frac{u_{*t}}{0.4}\right) \ln\left(\frac{z}{z_0}\right)$$

Where

u (z) = wind speed at height "z" (m/s)
u_{*_t} = threshold friction velocity (m/s)
z = height above surface
z_o = roughness height (cm) (see p. 22 of this calculation)

- u_{*_t} = 25 cm/s = 0.25 m/s
- z = 7 m = 700 cm (Note: typical weather station sensor height)
- z_o = 2.0 cm. Excavated surface has been considered as grassland because there will not be too much of loose soil as plowed field (Figure 3-6, p. 22 of this calculation).

$$u(z = 7\ m) = u_t = \left(\frac{0.25\ m/s}{0.4}\right) \ln\left(\frac{700\ cm}{2\ cm}\right) = 3.66\ m/s$$

- [u] = 3.9 m/s (from Table 4-1 for Burlington, Vermont; pp. 20-21 of this calc.)

- To find F(x)

$$x = 0.886\ u_t/[u]$$
$$= 0.866 \times \frac{3.66\ m/s}{3.9\ m/s} = 0.831$$

F (x = .831) = 1.75 (from Figure 4-3, p. 23 of this calculation)

- To find V

During future construction activities assume 80% of the area will be excavated for construction (see Figure 1, p. 11 of this calculation).

Thus $A = 0.80 \times 168{,}100 = 134{,}480\ ft^2$

Bare area where the workers will be exposed during work = 80% of the area

Fraction of subsurface not subjected to erosion, V = 20%

$$E_{10} = 0.036\ (1 - 0.20) \left(\frac{3.9\ m/s}{3.66\ m/s}\right)^3 (1.75)$$

$$= 0.036 \times 0.8 \times 1.21 \times 1.75$$
$$= \underline{0.061\ g/m^2\ hr = 6.1 \times 10^{-2}\ g/m^2\ hr}$$

(ii) Determine R_w (total mass emission rate for wind erosion of subsurface soil) using Equation 2-1 in the manual (p. 26 of this calculation):

$$R_w = \alpha_{sub}\ E_w\ A$$

Where

R_w = emission rate of contaminant (g/hr)
α_{sub} = Mass fraction of subsurface soil contaminant (unitless)
A = source area extent (m^2)

- α_{sub} = contaminant specific
- $E_w = E_{10} = 6.1 \times 10^{-2}\ g/m^2\ hr$
- $A = 134{,}480\ ft^2 = 12{,}494\ m^2$

$$R_w = \alpha_{sub}\ (6.1 \times 10^{-2}\ g/m^2\ hr)\ (12{,}494\ m^2)$$
$$= \underline{762.13\ \alpha_{sub}\ g/hr}$$

d) Emissions Due to Construction Activities

Emissions from the soil exposed during future construction activities will be accounted

for in the construction assessment of emissions modeled in this section.

(i) Earth moving operations on the site are assumed to be batch drop operations. The quantity of particulate emissions generated by batch drops can be estimated by using the empirical equation given in *AP-42* - Chapter 13.2 p. 13.2.2-3 (pp. 28-31 of this calculation).

$$E = k\,(0.0032)\,\frac{\left[\frac{U}{5}\right]^{1.3}}{\left[\frac{M}{2}\right]^{1.4}}\ (lb/ton)$$

Where

E = emission factor (lb/ton)
k = particle size multiplier (dimensionless)
U = mean wind speed (mph)
M = material moisture content (%)

- Particle size multiplier (k)

  Since the mode for subsurface soil = 0.00625 mm = 6.25 μm, using table given on p. 31 of this calculation

  k = 0.2375 (by interpolation)

- Moisture content (M_{avg})

  $M_{avg} = \frac{34.8 + 37.8}{2} = 36.3\%$ (From p. 17 of this calculation)

- Wind speed (U)

  Mean wind speed of the areas which is considered to be similar to Burlington, VT, is 3.9 m/s (from Table 4-1, pp. 20-21 of this calculation).

  U = 3.9 m/s = 8.72 mph

$$E = (0.2375)\,(0.0032)\,\frac{\left[\frac{8.72}{5}\right]^{1.3}}{\left[\frac{36.3}{2}\right]^{1.4}}\ lb/ton$$

$= \underline{2.707 \times 10^{-5} \text{ lb/ton}}$

(ii) Section 13.2.2 of *AP-42*, has been used to calculate the fugitive dust emissions during heavy construction activities (e.g., loading, unloading, equipment movement, and batch continuous drop operations)

- Assume a cycle of 30 sec/load, in an hour backhoe can process:

  (3,600 sec/hr)/30 sec/load = 120 load/hr

- Capacity of the backhoe bucket = 1.5 yd^3
  Assume soil weighs 2 ton/yd^3, the mass of soil moved in one hour is

  (120 load/hr) (1.5 yd^3/load) (2 ton/yd^3) = 360 tons/hr

- Given the construction area to be 134,480 ft^2 the emission rate is:

  E_{emo} = [(2.707 x 10^{-5} lb/ton) x (360 tons/hr)]/134,480 ft^2
  = 7.25 x 10^{-8} lb/ft^2 hr

- Assume two backhoes will be used in the construction area

  E_{emo} = 2 x (7.25 x 10^{-8} lb/ft^2 hr) x (3.2808 ft/m)^2 x (1g/0.0022 lb)
  = $\underline{7.0942 \times 10^{-4} \text{ g/m}^2 \text{ hr}}$

(iii) Total mass emission rate for earth moving operations can be calculated from:

$R_{emo} = \alpha_{sub} E_{emo} A$

Where

R_{emo} = emission rate of contaminant (g/hr)
α_{sub} = mass fraction of subsurface contaminants
E_{emo} = emission factor (g/m^2 hr)
A = source extent = area under construction

- E_{emo} = 7.0942 x 10^{-4} g/m^2 hr
- A = 134,480 ft^2 = 12,494 m^2

R_{emo} = α_{sub} (7.0942 x 10^{-4} g/m^2hr) (134,480 ft^2) (1m/3.2808 ft)^2
= $\underline{8.864\ \alpha_{sub}\ \text{g/hr}}$

e) Construction Activities - Traffic

(i) For traffic on the construction site, *AP-42*, Chapter 13 is used. Emissions in the

construction area will be calculated by Equation 1, Chapter 12.2.1-1, Unpaved Roads (pp. 32-33 of this calculation.) The following empirical expression is used to estimate the quantity of particulate emissions from an unpaved road:

$$E = k\,(1.7)\left[\frac{s}{12}\right]\left[\frac{S}{48}\right]\left[\frac{W}{2.7}\right]^{0.7}\left[\frac{w}{4}\right]^{0.5}\left[\frac{365-p}{365}\right]\frac{kg}{VKT}$$

Where

E = emission factor
k = particle size multiplier (dimensionless)
s = silt content of road surface material (%)
S = mean vehicle speed (km/hr)
W = mean vehicle weight (Mg)
w = mean number of wheels
p = number of days with at least 0.254 mm of precipitation per year (number of wet days per year)

- Mode for surface soil = 0.65, Mode for subsurface soil = 0.00625
  Mode = 1/2 (.65 + .00625) = 0.328 mm = 328 μm
  k = particle size multiplier = 1
- s = silt content of surface material
  $s_{avg} = \frac{18.2 + 10}{2} = 14.1\%$
- S = mean vehicle speed for the construction area = 10 km/hr (Table 4-2 of *AP-42*)
- W = 10 Mg (average weight of security and construction vehicle)
- w = 5 wheels (p. 33 of this calculation)
- p = 140 days (For Plattsburgh AFB, from Fig. 4-4, p. 27 of this calculation)

$$E_{10} = 1(1.7)\left[\frac{14.1}{12}\right]\left[\frac{21}{48}\right]\left[\frac{10}{2.7}\right]^{0.7}\left[\frac{5}{4}\right]^{.5}\left[\frac{365-140}{365}\right]\frac{kg}{VKT}$$

= 1 x 1.7 x 1.175 x 0.4375 x 2.5 x 1.118 x 0.616 kg/VKT
= <u>1.5046 kg/VKT</u>

(ii) Total mass emission rate for vehicular traffic

$R_{traffic} = \alpha_{sub}\, E_{10}\, A$ [Equation 2-1 in the manual]

Where

$R_{traffic}$ = emission rate of contaminant

α_{surf} = mass fraction of surface contaminants (unitless)
E_{10} = emission factor
A = source extent (#VKT/yr)

- Assume average of 10 vehicles will make 2 round trips per day approximately 1 km/trip

  A = 365 days/yr x 2 trips/days x 10 vehicles x 1 km
  = 7,300 VKT/yr

- E_{10} = 1.5046 kg/VKT

R_{traff} = α_{sub} (1.5046 kg/VKT) (7,300 VKT/yr)
= α_{sub} (11,000 kg/yr)
= α_{sub} (11,000 kg/yr) (1,000g/kg) (1 yr/365 days) (1 day/24 hrs)
= 1,256 α_{sub} g/hr

f) Maximum Actual Annual Impact (C_a)

(i) To determine the area source emission rate, use the following equation from p. B-11 of *NYS Air Guide-1* (pp. 34-35 of this calculation):

$$Q_A = \frac{Q_a}{A}$$

Where

Q_A = area source emission rate (1 lb/hr ft^2)
Q_a = emission rate (lb/hr)
A = area (ft^2) = 168,000 ft^2

- $Q_a = R_w + R_{emo} + R_{traffic}$
  = 762.13 α_{sub} g/hr + 8.864 α_{sub} g/hr + 1,256 α_{sub} g/hr
  = 2,027 α_{sub} g/hr (0.0022 lb/g)
  = 4.46 α_{sub} lb/hr

- A = 168,000 ft^2

$$Q_A = \frac{4.46\ \alpha_{subs}}{168{,}100\ ft^2}$$

$$= 2.65 \times 10^{-5}\ \alpha_{sub}\ \text{lb/hr-ft}^2$$

(ii) To determine the Maximum Actual Annual Impact (C_a), the alternate area source method from *NYS Air Guide-1* was used because it addresses areas up to 3,300

ft x 3300 ft. The present site is equal to 168,100 ft^2 (i.e., 410 ft x 410 ft). The entire area will be subjected to fugitive dust. Using the following equation from p. B-11 of the *NYS Air Guide-1* (pp. 34-35 of this calculation):

$$C_a\ (ug/m^3) = KQ_A\ C_m$$

Where

K = 15 for $330 \leq S \leq 3300$
= 30 for $S > 3300$
S = length of a side of the area source
C_m = conversion factor from lb/hr ft^2 to $\mu g/m^2s$
Q_A = area source emission rate

- $C_m = 1.355 \times 10^6$ (conversion factor from lb/hr ft^2 to $\mu g/m^2s$).
- S = 410 ft, so K = 15
- $Q_A = 26.5 \times 10^{-6}\ \alpha_{sub}$ lb/hr-ft^2 area source emission rate

$$C_a = (15)\ (26.5 \times 10^{-6}\ \alpha_{sub})\ (1.355 \times 10^6)$$
$$= 538.6\ \alpha_{sub}\ \mu g/m^3$$
$$= 0.5386\ \alpha_{sub}\ mg/m^3$$
$$= \underline{53.86 \times 10^{-2}\ \alpha_{sub}\ mg/m^3}$$

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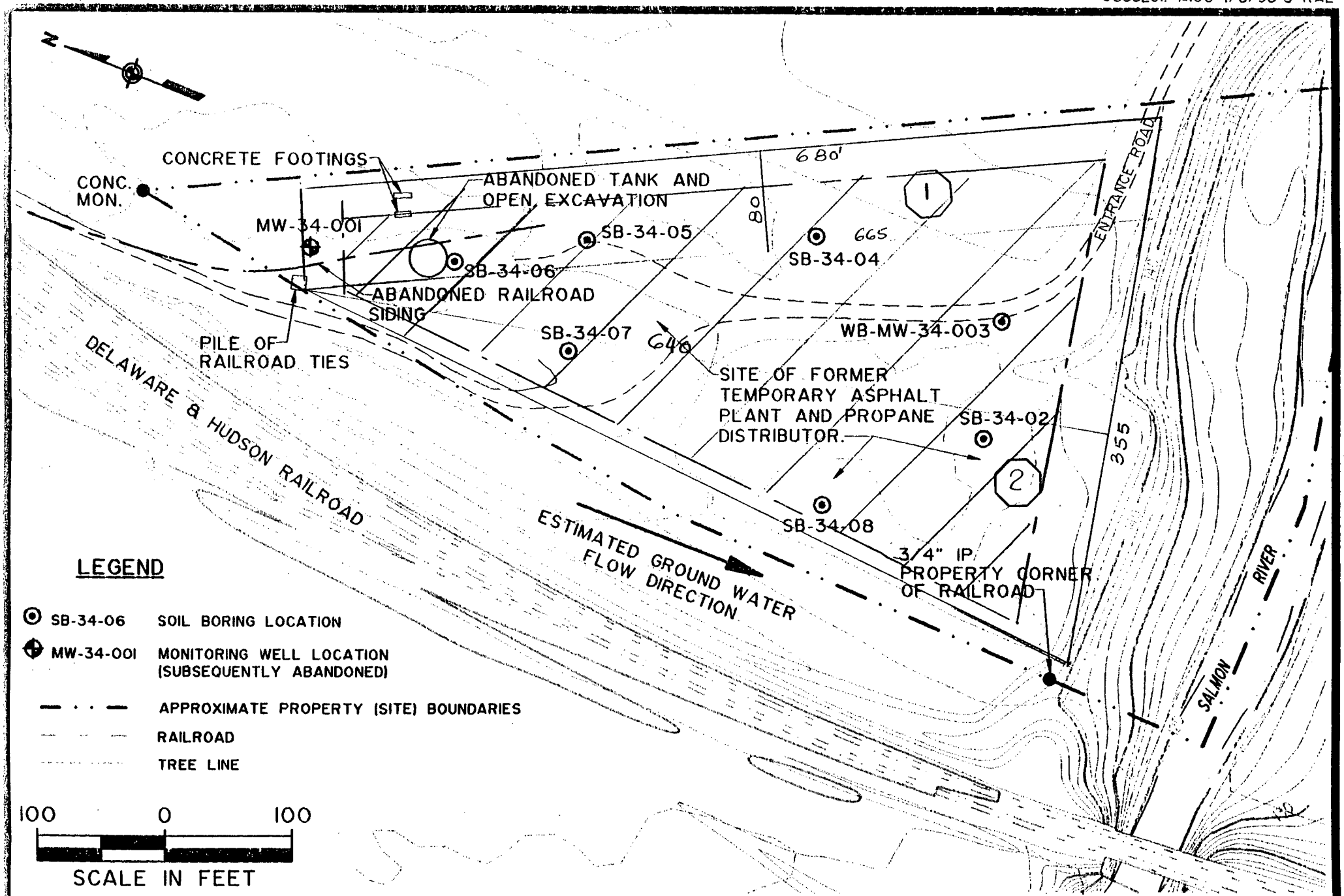


URS CONSULTANTS, INC.

SS-034 SOUTH CLEAR ZONE SITE MAP

FIGURE 1

Determine the Area of the Site

$$A_1 = \left(\frac{680\ ft + 665\ ft}{2}\right) x\ 80\ ft = 53{,}800\ ft^2$$

$$A_2 = \frac{355\ ft\ x\ 640\ ft}{2} = 113{,}600\ ft^2$$

$$A_1 + A_2 = 53{,}800\ ft^2 + 113{,}600\ ft^2 = 167{,}400\ ft^2$$

Equivalent size = 409 ft x 409 ft or approximately 410 ft x 410 ft

Therefore,

Area of site = 168,100 ft^2 = 15,617 m^2

Subsurface Soil

Because dwellings constructed at the site are assumed to have a basement and the water table in this area is 8 feet below ground surface, construction excavation are assumed to be 8 feet below ground surface.

(i) Well boring MW 34-003 soil depth 7 ft - 9 ft

$$\text{Soil mode} = \frac{0.010 + 0.0065}{2} = 0.00825$$

(ii) Well boring MW34-001 6 ft - 8 ft deep

Soil mode (i) $\frac{0.0025 + 0.0045}{2} = 0.0035$

(ii) $\frac{0.0045 + 0.0055}{2} = 0.005$

Average mode = 1/2 (0.0035 + 0.005)

Soil mode at this depth = 0.00425

(iii) Representative soil mode for the site $= \frac{0.00825 + 0.00425}{2}$

= 0.00625 mm

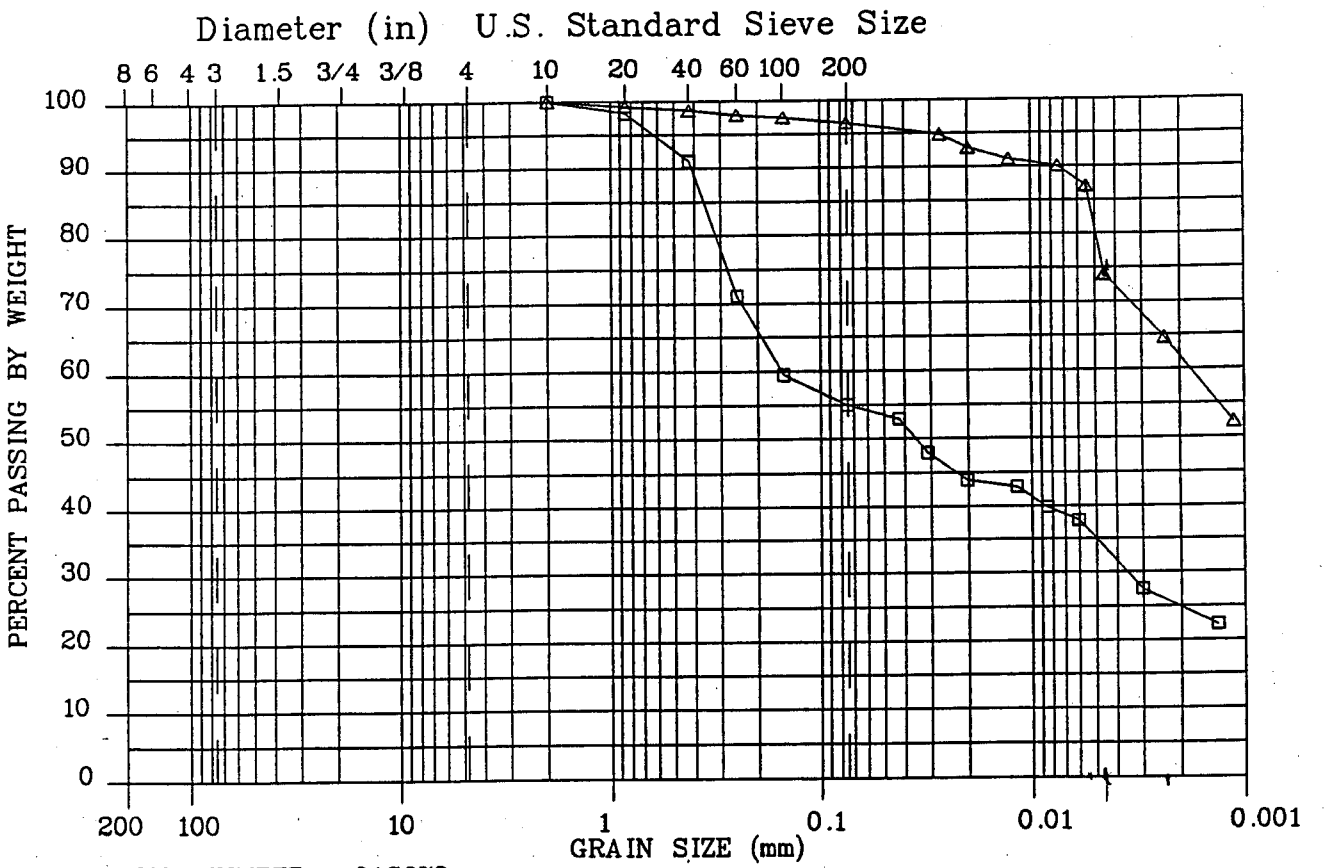
Surface Soil

(i) WB-MW-34-003 d-2ft

$$\text{Soil mode} = \frac{0.85 + 0.45}{2} = 0.65 \text{ mm}$$

GeoSystems Consultants
Fort Washington Laboratory
Particle Size Distribution

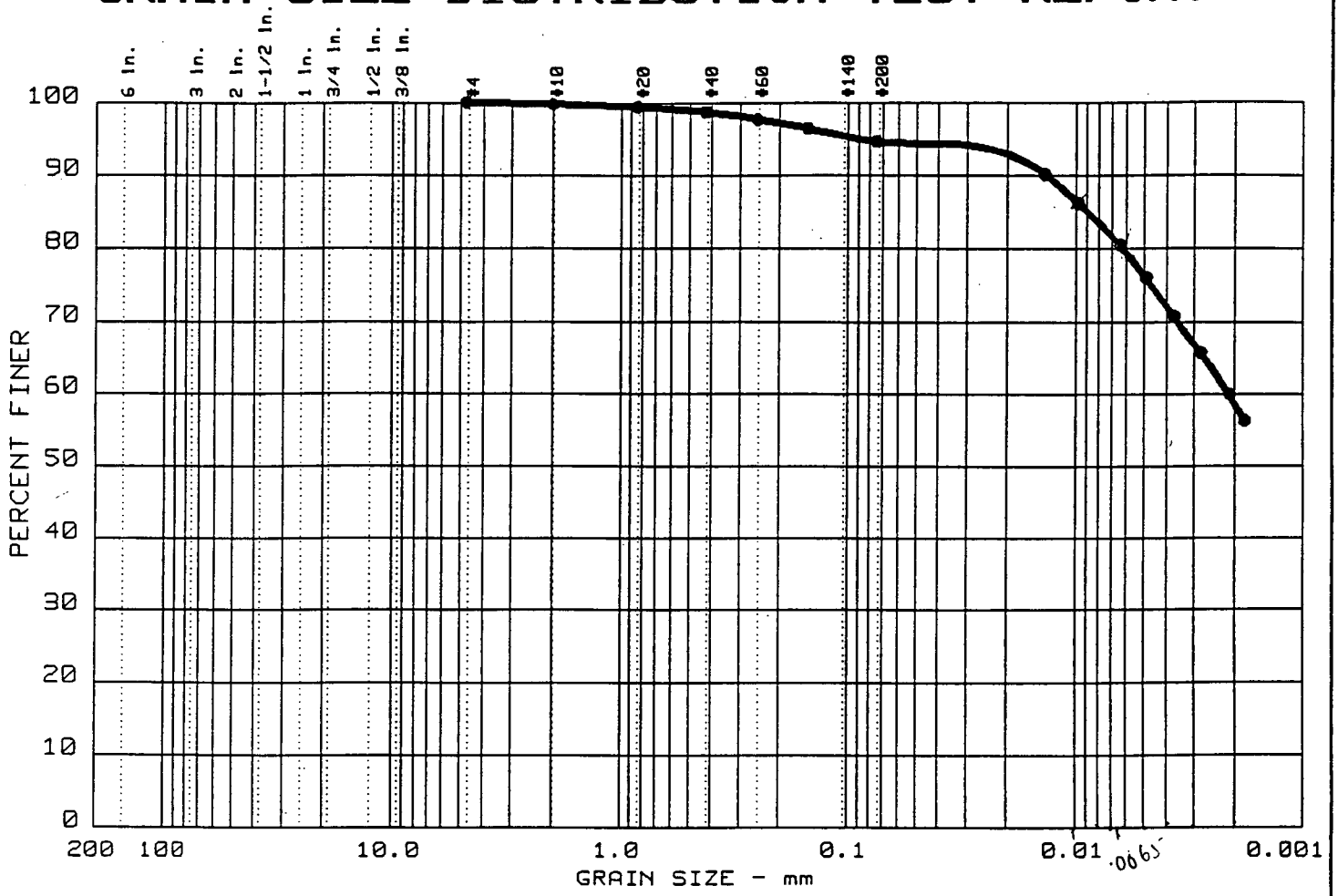
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



JOB NUMBER : 94G078
JOB NAME : URS;SS-034 SOUTH CLEAR ZONE

SYM	BORING#	SAMPLE#	DEPTH	DESCRIPTION	W(%)	W_L (%)	W_P (%)
□	WB-MW-34	001	2-4	GRAY SANDY SILTY CLAY (CL)		29	16
△	WB-MW-34	001	6-8	GRAY SILTY CLAY (CH)		70	30

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	0.0	5.4	18.2	76.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	61	39								

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN CLAY, Little Silt, trace sand	CH	

Project No.: G008.018
Project: PLATTSBURGH AIR FORCE BASE
● Location: WB-MW-34-003 / 7'- 9'

Date: DECEMBER 6, 1994

Remarks:
CLIENT: URS CONSULTANTS
WATER CONTENT: 34.8%

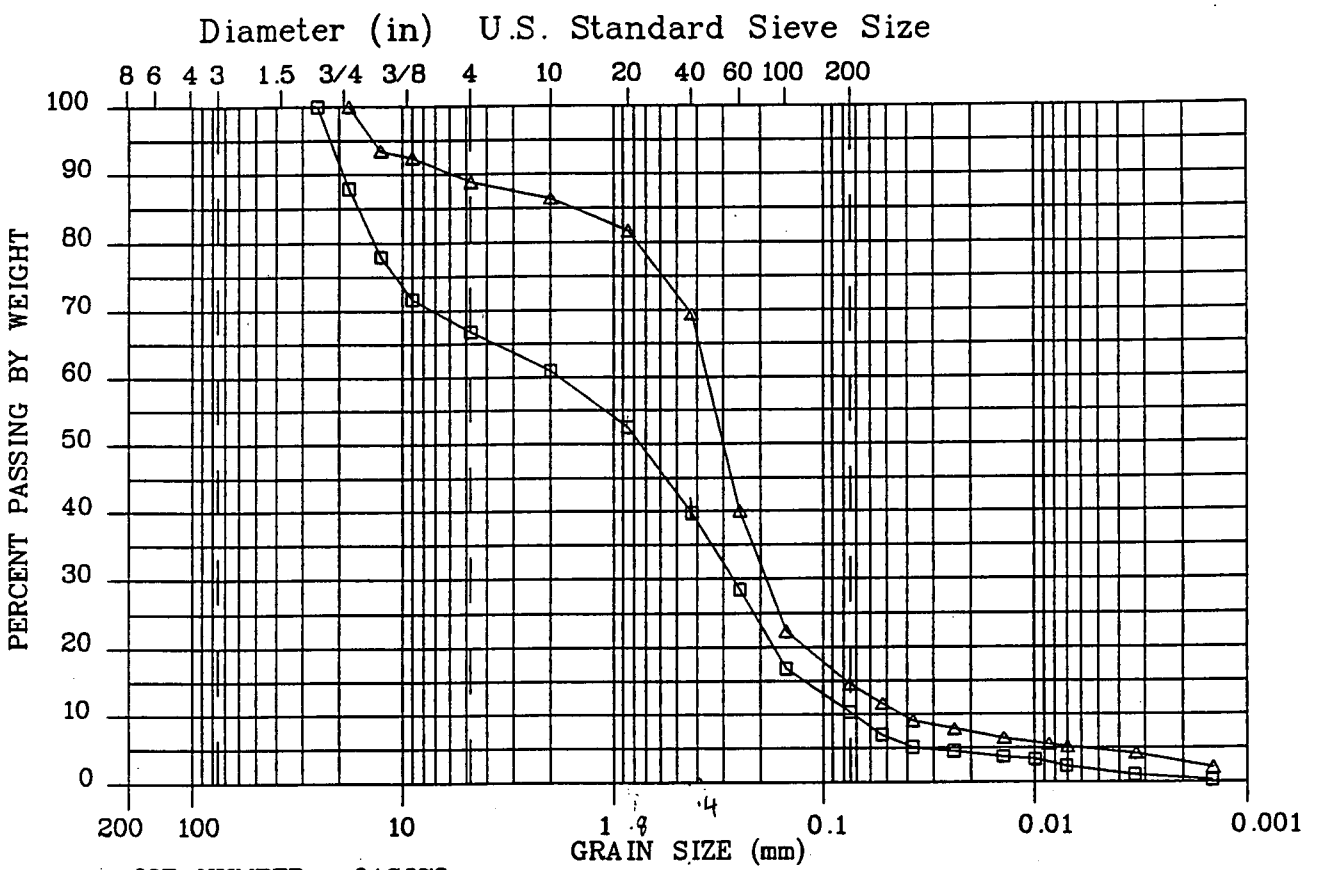
LAB NO. 2168.019

GRAIN SIZE DISTRIBUTION TEST REPORT
HUNTINGDON ENGINEERING & ENVIRONMENTAL

Figure No. 1

GeoSystems Consultants
Fort Washington Laboratory
Particle Size Distribution

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



JOB NUMBER : 94G078
JOB NAME : URS: SS-034 SOUTH CLEAR ZONE

SYM	BORING#	SAMPLE#	DEPTH	DESCRIPTION	W(%)	W_L (%)	W_P (%)
□	WB-MW-34	003	0-2	GRAY SILTY GRAVELLY COARSE TO FINE SAND (SM)			
△	WB-MW-34	007	0-2	GRAY SILTY GRAVELLY COARSE TO FINE SAND (SM)			

TABLE 3-2

SOUTH CLEAR ZONE (SS-034)
GEOTECHNICAL ANALYSIS SUMMARY

	GRAIN SIZE DISTRIBUTION				USCS Class	Water Content	Permeability (Vertical/cm/s)
Sample Location/Depth	% Gravel	% Sand	% Silt	% Clay			
WB-MW-34-001/2' - 4'	0.0	45	55		CL*	18.7	--
WB-MW-34-001/6 '- 8'	0.0	3	97		CH*	37.8	--
WB-MW-34-001/10' - 12'	3.8	22.6	21.3	52.3	CL*	28.9	3.10×10^{-8}
WB-MW-34-001/16 '- 18'	13	32	55		CL*	11.8	--
WB-MW-34-003/0' - 2'	23	67	10		SM	5.2	--
WB-MW-34-003/7' - 9'	0.0	5.4	18.2	76.4	CH*	34.8	2.86×10^{-7}
SB-34-007/0' - 2'	12	74	14		SM	11.7	--

* Determined from Atterberg Limits Analysis

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United States
Environmental Protection
Agency

Office of Health and
Environmental Assessment
Washington DC 20460

February 1985

PB85-192219

Research and Development

EPA

Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites

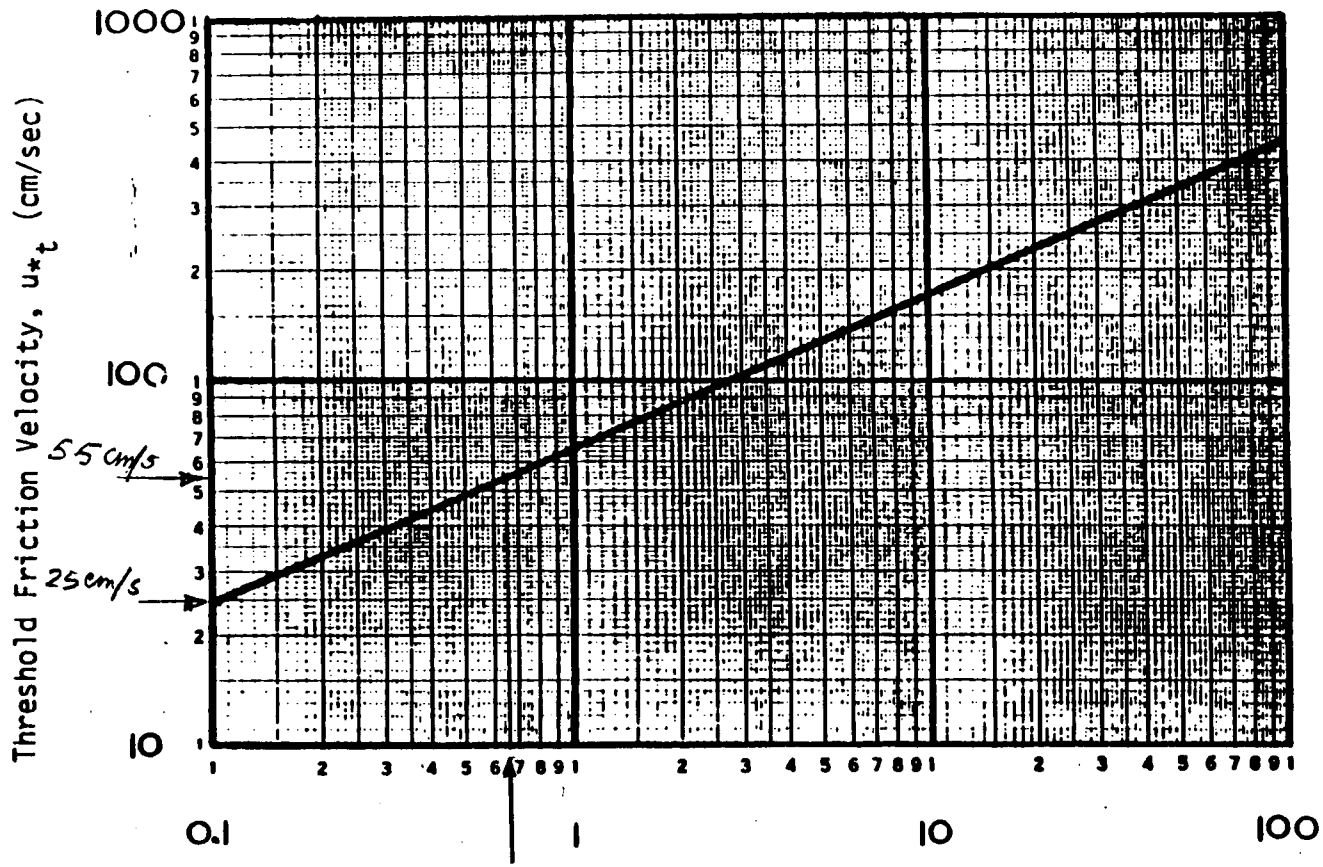

Figure 3-4. Relationship of Threshold Friction Velocity to Size Distribution Mode

TABLE 4-1. FASTEST MILE[a] [u^+] AND MEAN WIND SPEED[b] [u] FOR SELECTED UNITED STATES STATIONS

Station	State	[u^+] (m/s)	[u] (m/s)	Station	State	[u^+] (m/s)	[u] (m/s)
Birmingham	AL	20.8	3.3	Detroit	MI	21.8	4.6
Montgomery	AL	20.2	3.0	Grand Rapids	MI	21.6	4.5
Tucson	AZ	23.0	3.7	Lansing	MI	23.7	4.6
Yuma	AZ	21.8	3.5	Sault St. Marie	MI	21.6	4.3
Fort Smith	AR	20.8	3.4	Duluth	MN	22.8	5.1
Little Rock	AR	20.9	3.6	Minneapolis	MN	22.0	4.7
Fresno	CA	15.4	2.8	Jackson	MS	20.5	3.4
Red Bluff	CA	23.3	3.9	Columbia	MO	22.4	4.4
Sacramento	CA	20.6	3.7	Kansas City	MO	22.6	4.6
San Diego	CA	15.4	3.0	St. Louis	MO	21.2	4.2
Denver	CO	22.0	4.1	Springfield	MO	22.4	5.0
Grand Junction	CO	23.6	3.6	Billings	MT	26.6	5.1
Pueblo	CO	28.1	3.9	Great Falls	MT	26.4	5.9
Hartford	CT	20.2	4.0	Havre	MT	25.9	4.5
Washington	DC	21.6	3.4	Helena	MT	24.7	3.5
Jacksonville	FL	21.7	3.8	Missoula	MT	21.6	2.7
Tampa	FL	22.2	3.9	North Platte	NE	27.7	4.6
Atlanta	GA	21.2	4.1	Omaha	NE	24.6	4.8
Macon	GA	20.1	3.5	Valentine	NE	27.1	4.8
Savannah	GA	21.3	3.6	Ely	NV	23.6	4.7
Boise	ID	21.4	4.0	Las Vegas	NV	24.4	4.0
Pocatello	ID	23.8	4.6	Reno	NV	25.2	2.9
Chicago	IL	21.0	4.6	Winnemucca	NV	22.4	3.5
Moline	IL	24.5	4.4	Concord	NH	19.2	3.0
Peoria	IL	23.2	4.6	Albuquerque	NM	25.6	4.0
Springfield	IL	24.2	5.1	Roswell	NM	26.0	4.1
Evansville	IN	20.9	3.7	Albany	NY	21.4	4.0
Fort Wayne	IN	23.7	4.6	Binghampton	NY	22.0	4.6
Indianapolis	IN	24.8	4.3	Buffalo	NY	24.1	5.5
Burlington	IA	25.0	4.6	New York	NY	22.5	5.5
Des Moines	IA	25.8	5.0	Rochester	NY	23.9	4.3
Sioux City	IA	25.9	4.9	Syracuse	NY	22.5	4.4
Concordia	KS	25.7	5.4	Cape Hatteros	NC	25.9	5.1
Dodge City	KS	27.1	6.3	Charlotte	NC	20.0	3.4
Topeka	KS	24.4	4.6	Greensboro	NC	18.9	3.4
Wichita	KS	26.0	5.6	Wilmington	NC	22.3	4.0
Louisville	KY	22.0	3.8	Bismarck	ND	26.1	4.7
Shreveport	LA	19.9	3.9	Fargo	ND	26.6	5.7
Portland	ME	21.7	3.9	Cleveland	OH	23.6	4.8
Baltimore	MD	25.0	4.2	Columbus	OH	22.1	3.9
Boston	MA	25.2	5.6	Dayton	OH	24.0	4.6

TABLE 4-1 (concluded)

Station	State	$[u^+]$ (m/s)	[u] (m/s)	Station	State	$[u^+]$ (m/s)	[u] (m/s)
Toledo	OH	22.7	4.2	Dallas	TX	21.9	4.9
Oklahoma City	OK	24.1	5.7	El Paso	TX	24.8	4.2
Tulsa	OK	21.4	4.7	Port Arthur	TX	23.7	4.5
Portland	OR	23.5	3.5	San Antonio	TX	21.0	4.2
Harrisburg	PA	20.4	3.4	Salt Lake City	UT	22.6	3.9
Philadelphia	PA	22.1	4.3	Burlington	VT	20.4	3.9
Pittsburgh	PA	21.6	4.2	Lynchburg	VA	18.3	3.5
Scranton	PA	19.9	3.8	Norfolk	VA	21.8	4.7
Huron	SD	27.4	5.3	Richmond	VA	18.9	3.4
Rapid City	SD	27.3	5.0	Quillayute	WA	16.3	3.0
Chattanooga	TN	21.4	2.8	Seattle	WA	18.7	4.1
Knoxville	TN	21.8	3.3	Spokane	WA	21.4	3.9
Memphis	TN	20.3	4.1	Green Bay	WI	25.3	4.6
Nashville	TN	20.9	3.6	Madison	WI	24.9	4.4
Abilene	TX	24.4	5.4	Milwaukee	WI	24.0	5.3
Amarillo	TX	27.3	6.1	Cheyenne	WY	27.0	5.9
Austin	TX	20.2	4.2	Lander	WY	27.4	3.1
Brownsville	TX	19.5	5.3	Sheridan	WY	27.5	3.6
Corpus Christi	TX	24.4	5.4	Elkins	WV	22.8	2.8

[a] Data taken from Extreme Wind Speeds at 129 Stations in the Contiguous United States. Simiu, E., Filliben, J. J., and M. J. Changery. NBS Building Science Series 118. U.S. Department of Commerce, National Bureau of Standards, 1979.

[b] Data taken from Local Climatological Data - Annual Summaries for 1977. U.S. Department of Commerce, National Oceanic and Atmospheric Administration/Environmental Data Service/National Climatic Data Center.

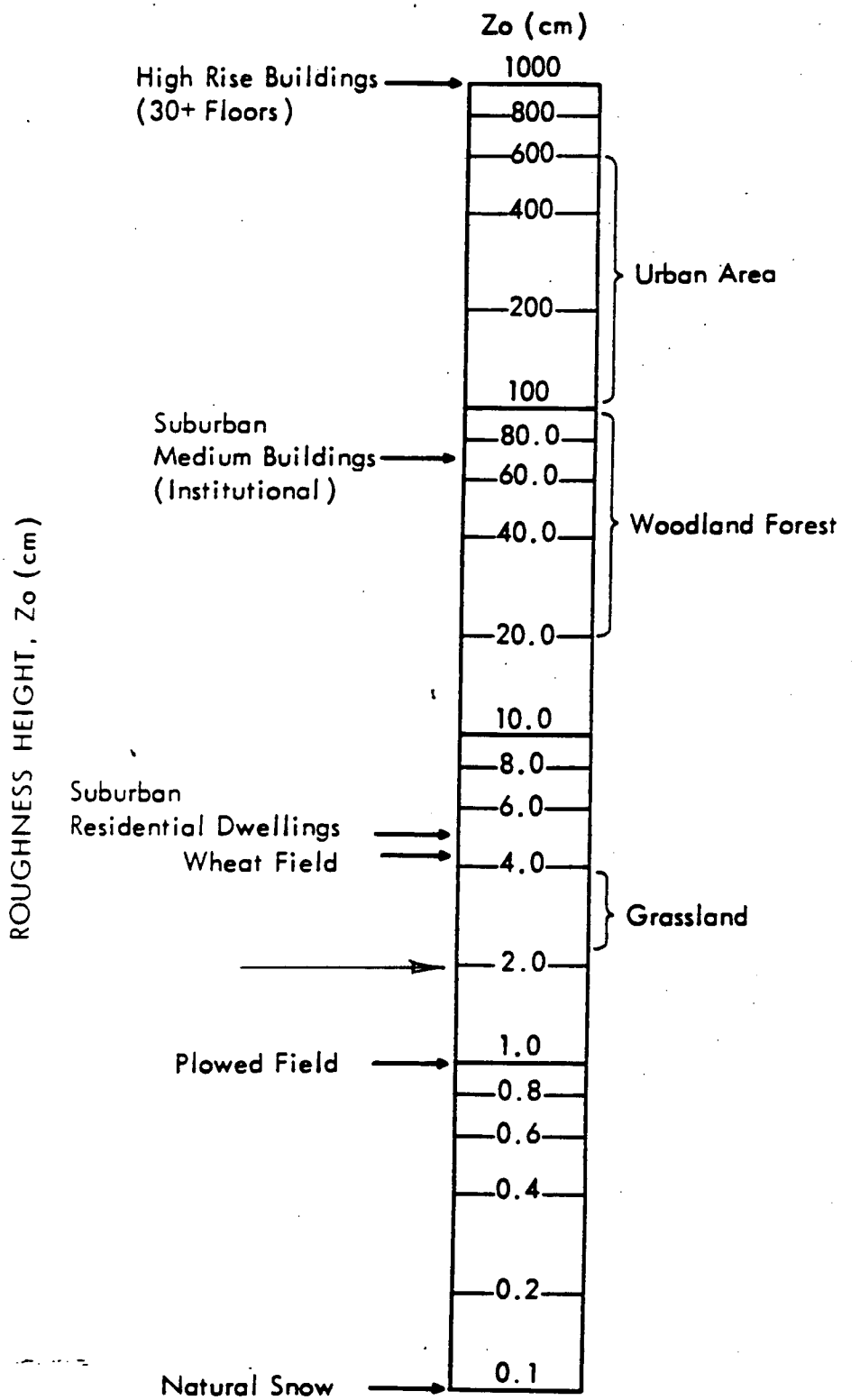

Figure 3-6. Roughness Heights for Various Surfaces (Cowherd and Guenther, 1976)

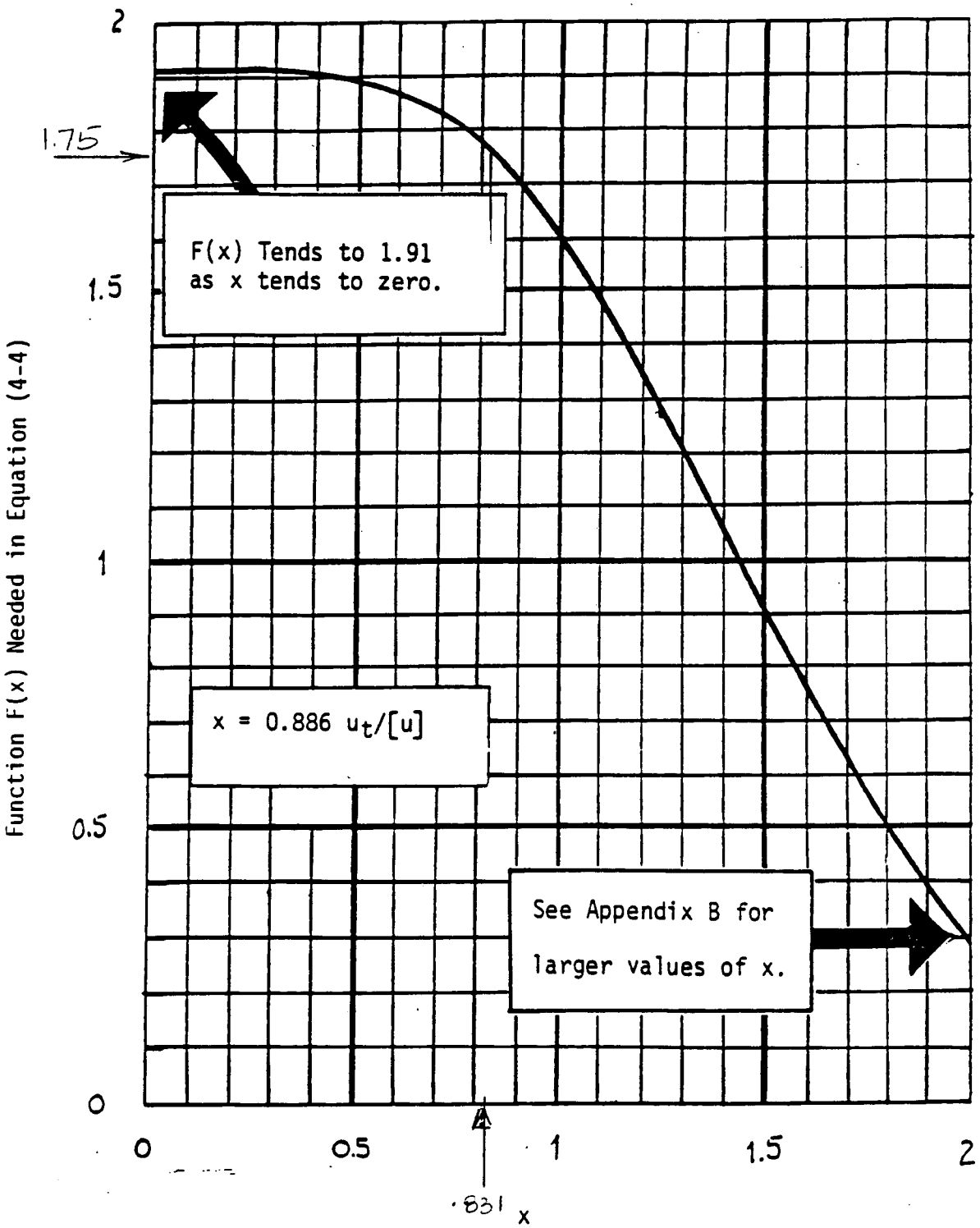

Figure 4-3. Graph of Function F(X) Needed to Estimate Unlimited Erosion

exposure of fresh surface material. This would occur whenever aggregate material is either added to or removed from the old surface. A disturbance of an exposed area may also result from the turning of surface material to a depth exceeding the size of the largest pieces of material present.

Although vehicular traffic alters the surface by pulverizing surface material, several vehicle passes may be required to restore the full erosion potential, except for surfaces that crust before substantial wind erosion occurs. In that case, breaking of the crust over the area of the tire/surface contact once again exposes the erodible material beneath.

Thornthwaites' P-E (PE) Index is a useful indicator of average surface soil moisture conditions. In the present context, the P-E Index is applied as a correction parameter for wind generated emissions in the limited reservoir case. Figure 4-2 provides a basis for selecting an appropriate P-E value.

The worst-case emission rate is calculated by assuming that a disturbance occurs just prior to the annual fastest mile event, both within the 24-h period of interest. For this calculation, use Equation (4-1) with $f = 30\ mo^{-1}$.

4.1.2 Wind Erosion from Surfaces with Unlimited Erosion Potential

For estimating respirable particulate emissions from wind erosion of surfaces with an "unlimited reservoir" of erodible particles, a predictive emission factor equation developed from Gillette's (1981) field measurements of highly erodible soils is recommended. In relating the annual average rate of respirable particulate emissions (per unit area) to field and climatic factors, the equation takes the following form:

$$E_{10} = 0.036\ (1-V)\ \left(\frac{[u]}{u_t}\right)^3\ F(x) \qquad (4\text{-}4)$$

where:

E_{10} = PM_{10} emission factor, i.e., annual average PM_{10} emission rate per unit area of contaminated surface (g/m^2-hr)

V = fraction of contaminated surface vegetative cover (equals 0 for bare soil)

$[u]$ = mean annual wind speed (m/s), taken from Table 4-1

$x = 0.886\ u_t/[u]$ = dimensionless ratio

$F(x)$ = function plotted in Figure 4-3

u_t = threshold value of wind speed at 7 m (m/s)

This follows from the empirical relationship that the vertical flux of particles smaller than 10 μm diameter is proportional to the cube of wind speed. Because highly erodible soils do not readily retain moisture, no moisture-related parameter is included in the equation.

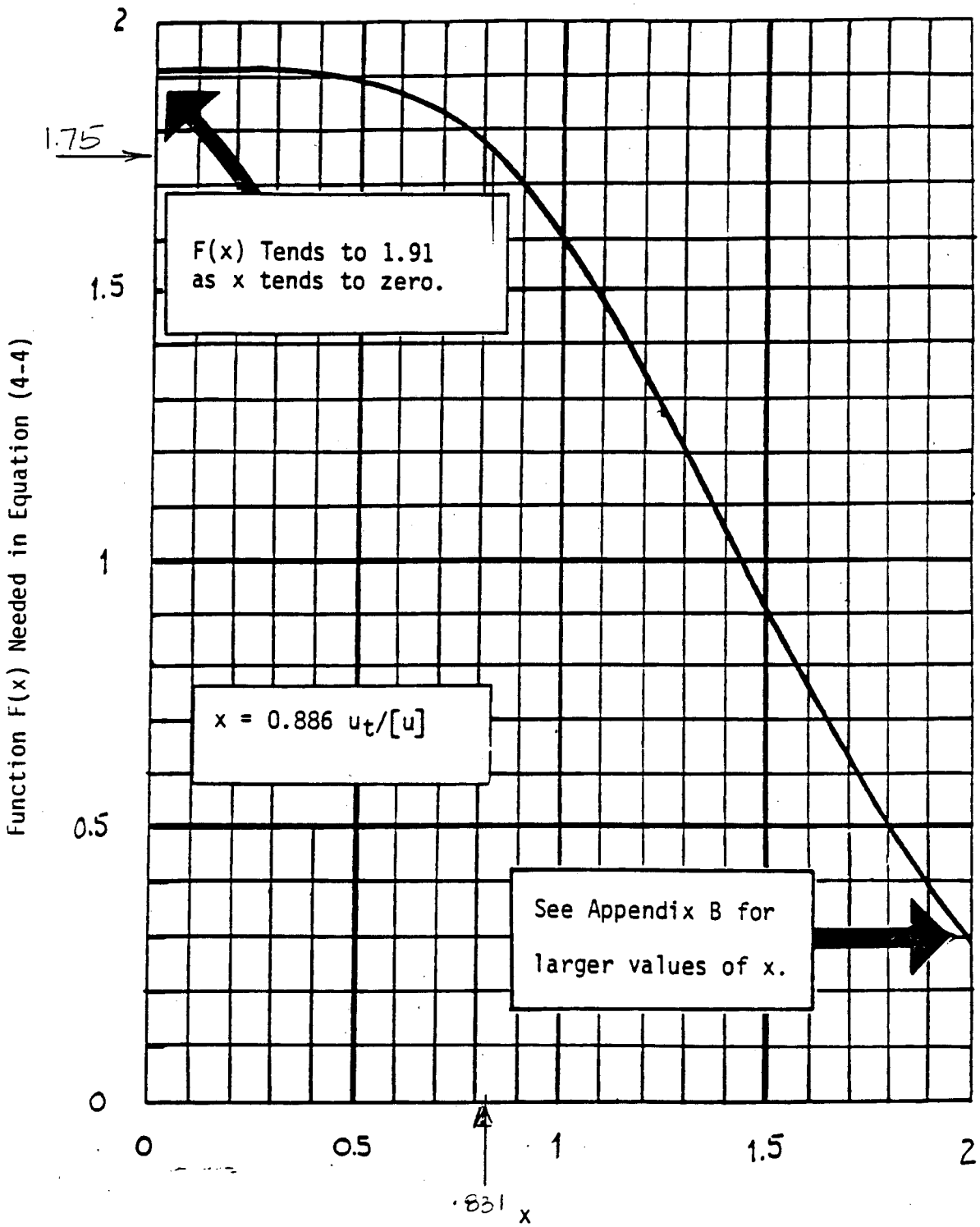

Figure 4-3. Graph of Function F(X) Needed to Estimate Unlimited Erosion

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Although vehicular traffic alters the surface by pulverizing surface material, several vehicle passes may be required to restore the full erosion potential, except for surfaces that crust before substantial wind erosion occurs. In that case, breaking of the crust over the area of the tire/surface contact once again exposes the erodible material beneath.

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where:

E_{10} = PM_{10} emission factor, i.e., annual average PM_{10} emission rate per unit area of contaminated surface (g/m^2-hr)

V = fraction of contaminated surface vegetative cover (equals 0 for bare soil)

$[u]$ = mean annual wind speed (m/s), taken from Table 4-1

$x = 0.886\ u_t/[u]$ = dimensionless ratio

$F(x)$ = function plotted in Figure 4-3

u_t = threshold value of wind speed at 7 m (m/s)

This follows from the empirical relationship that the vertical flux of particles smaller than 10 μm diameter is proportional to the cube of wind speed. Because highly erodible soils do not readily retain moisture, no moisture-related parameter is included in the equation.

u^+ = observed (or probable) fastest mile of wind for the period between disturbances (m/s)

$P(u^+)$ = erosion potential, i.e., quantity of erodible particles present on the surface prior to the onset of wind erosion (g/m^2)

V = fraction of contaminated surface area covered by continuous vegetative cover (equals 0 for bare soil)

PE = Thornthwaite's Precipitation Evaporation Index used as a measure of average soil moisture content

Although Equation 4-1 is based primarily on field tests of nonsoil surfaces (e.g., coal with a top size of 3 cm and a silt content exceeding 4%), subsoil and other crustal materials showed similar behavior. The erosion potential (in g/m^2) depends on the fastest mile (in m/s) as follows:

$$P(u^+) = 6.7\ (u^+ - u_t), \quad u^+ \geq u_t \qquad (4\text{-}2)$$
$$0 \quad , \quad u^+ < u_t$$

where u_t is the erosion threshold wind speed (in m/s), measured at a typical weather station sensor height of 7 m.

The threshold friction velocity determined from the site survey is converted to the equivalent wind speed at a height of 7 m using Figure 4-1. This figure assumes a logarithmic velocity profile near the earth's surface:

$$\frac{u(z)}{u_*} = \frac{1}{0.4} \ln (z/zo) \qquad (4\text{-}3)$$

where: u = wind speed at height z (m/s)
z = height above surface (cm)
u_* = friction velocity (m/sec)
z_o = roughness height (cm)

Mean annual fastest mile (u^+) values are presented in Table 4-1. The value for the weather station closest to the surface contamination site should be used.

Emissions generated by wind erosion of "limited reservoir" surfaces are also dependent on the frequency of disturbance (f) of the erodible surface, because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action which results in the

Step 1 - Estimation of Emissions

The technical approach for estimating respirable (PM_{10}) emissions from surface contamination sites is consistent with the technique used in air pollution assessments. It is based on the following equation:

$$R_{10} = \alpha E_{10} A \qquad (2\text{-}1)$$

where R_{10} = emission rate of contaminant as PM_{10} (mass/time)

α = fraction of contaminant in PM_{10} emissions (mass/mass)

E_{10} = PM_{10} emission factor (mass/source extent)

A = source extent (source-dependent units)

The emission factor is simply the ratio of uncontrolled emissions per unit of source extent. For wind erosion, the source extent is the area of erodible surface. In the case of emissions generated by mechanical disturbance, source extent is also the area (or volume) of the material from which the emissions emanate. Normally, the "uncontrolled" emission factor incorporates the effects of natural mitigation (e.g., rainfall). If anthropogenic control measures (e.g., treating the surface with a chemical binder which forms an artificial crust) are applied to the source, the uncontrolled emission factor must be reduced to reflect the resulting fractional control.

The first step in the estimation of atmospheric particulate emissions from a surface contamination site is to decide whether potential emissions are limited to those generated by wind erosion. If traffic over the site occurs, it is likely that the traffic emissions (or emissions from other forms of mechanical disturbance) substantially exceed emissions from wind erosion. This is because, for most parts of the country, vehicle traffic is an intensive entrainment mechanism in comparison with wind erosion.

For estimation of emissions from traffic on unpaved surfaces, a predictive emission factor equation is recommended in Section 4. This equation, developed from regression analysis of field test data, explains much of the observed variance in road dust emission factor values on the basis of variances in specific road surface and traffic parameters. Thus it provides more reliable estimates of source emissions on a site specific basis than does a single-valued average emission factor. The appropriate measure of source extent for this emission factor is obtained by converting traffic counts and road segment lengths into the total vehicle-distance traveled; in effect this represents the cumulative road surface area from which the emissions are released.

For estimating emissions from wind erosion, either of two emission factor equations are recommended in Section 4 depending on the erodibility of the surface material. In both cases, the appropriate measure of source

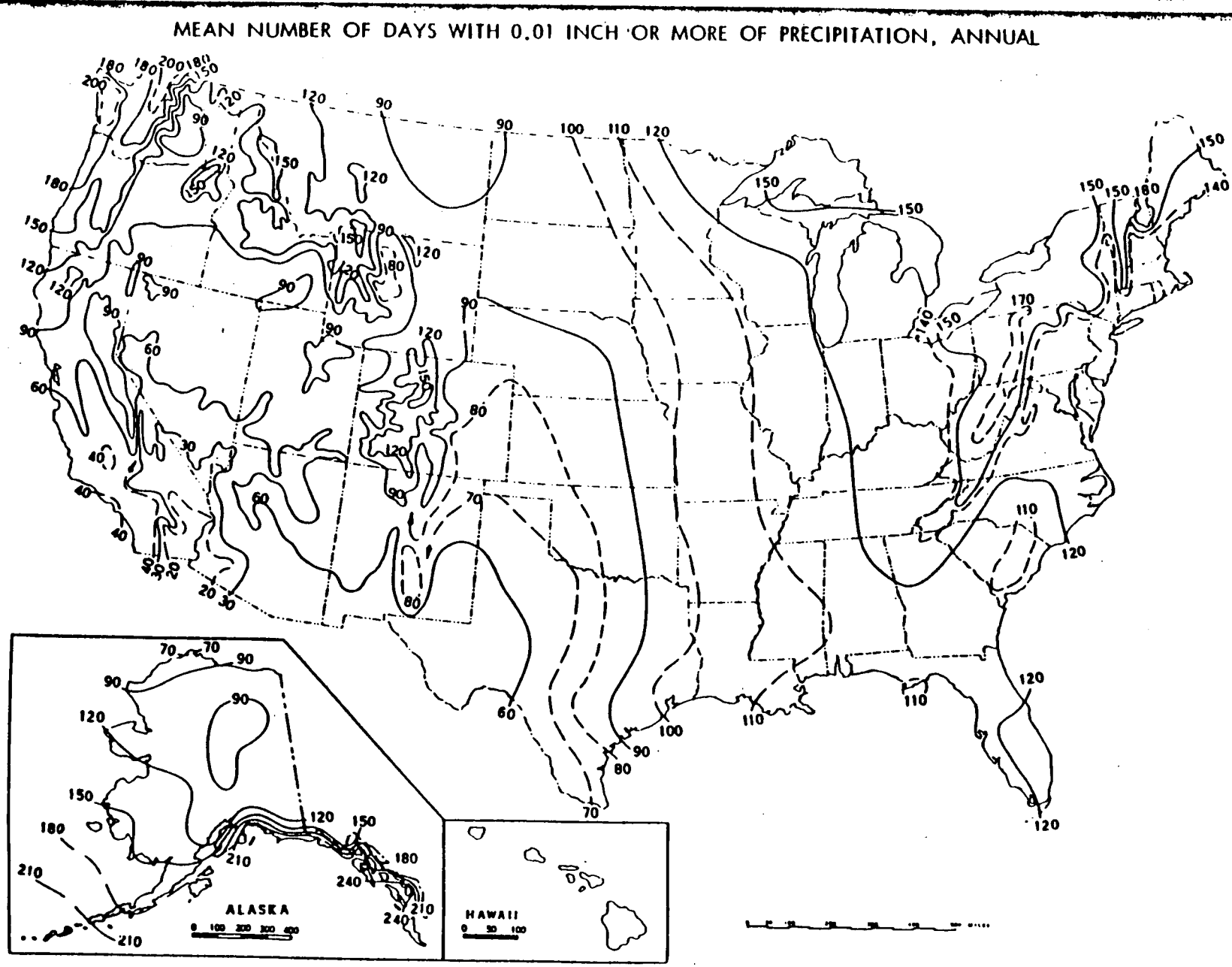

Figure 4-4. Map of Precipitation Frequency

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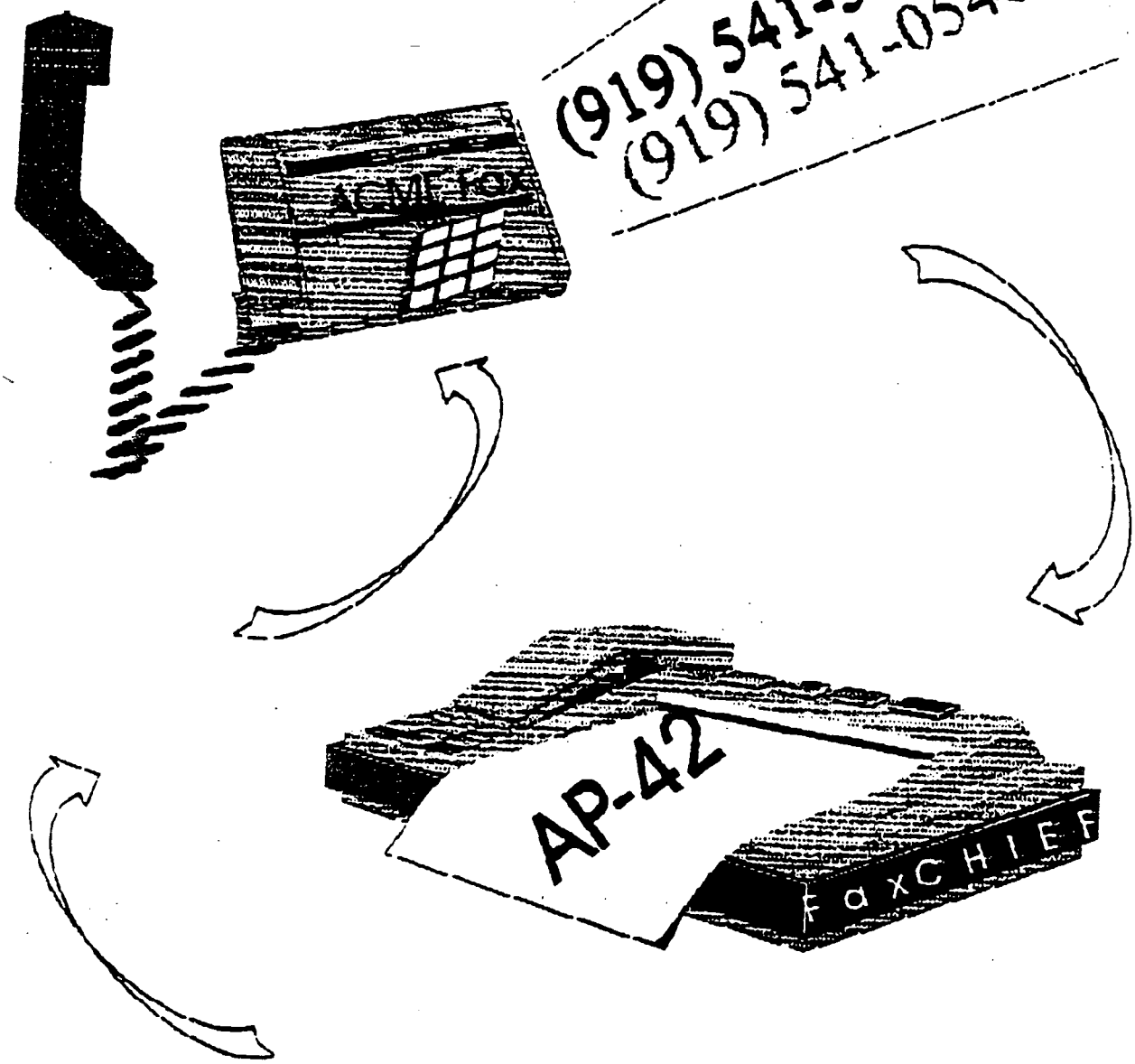

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13.2.2 AGGREGATE HANDLING AND STORAGE PILES

13.2.2.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, such as material loading onto the pile, disturbances by strong wind currents, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

13.2.2.2 Emissions And Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Emissions also depend on three parameters of the condition of a particular storage pile: age of the pile, moisture content, and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, the potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents, either from aggregate transfer itself or from high winds. As the aggregate pile weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and then the drying process is very slow.

Silt (particles equal to or less than 75 microns in diameter) content is determined by measuring the portion of dry aggregate material that passes through a 200-mesh screen, using ASTM-C-136 method.[1] Table 13.2.2-1 summarizes measured silt and moisture values for industrial aggregate materials.

13.2.2.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

Table 13.2.2-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. of Samples	Range	Mean	No. of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	-	17
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	-	15	1	-	6.6
		Sinter	1	-	0.7	0	-	-
		Limestone	3	0.4 - 2.3	1.0	2	NA	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	NA	1	1	-	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	-	-
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	-	2.6	1	-	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	-	9.2	1	-	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	-	12	1	-	11

[a]References 1 - 10. NA = Not Available.

The quantity of particulate emissions generated by either type of drop operation, per kg (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

$$E = k(0.0016) \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (kg/Mg)}$$

$$E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (lb/ton)}$$

where: E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, m/s (mph)
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) for Equation				
< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
0.74	0.48	0.35	0.20	0.11

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the two was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced one quality rating level, if the silt content used in a particular application falls outside the range given:

Ranges Of Source Conditions For Equation

		Wind Speed	
Silt Content (%)	Moisture Content (%)	(m/s)	(mph)
0.44 - 19	0.25 - 4.8	0.6 - 6.7	1.3 - 15

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site specific values for

13.2.1 UNPAVED ROADS

13.2.1.1 General

Dust plumes trailing behind vehicles traveling on unpaved roads are a familiar sight in rural areas of the United States. When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

13.2.1.2 Emissions Calculation And Correction Parameters

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on correction parameters (average vehicle speed, average vehicle weight, average number of wheels per vehicle, road surface texture and road surface moisture) that characterize the condition of a particular road and the associated vehicle traffic.[1-4]

Dust emissions from unpaved roads have been found to vary in direct proportion to the fraction of silt (particles smaller than 75 micrometers in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. Table 13.2.1-1 summarizes measured silt values for industrial and rural unpaved roads.

Since the silt content of a rural dirt road will vary with location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall. The temporary reduction in emissions caused by precipitation may be accounted for by not considering emissions on "wet" days (more than 0.254 millimeters [0.01 inches] of precipitation).

The following empirical expression may be used to estimate the quantity of size specific particulate emissions from an unpaved road, per vehicle kilometer traveled (VKT) or vehicle mile traveled (VMT):

$$E = k(1.7)\left(\frac{s}{12}\right)\left(\frac{S}{48}\right)\left(\frac{W}{2.7}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5}\left(\frac{365-p}{365}\right) \quad \text{(lb/VKT)}$$

$$E = k(5.9)\left(\frac{s}{12}\right)\left(\frac{S}{30}\right)\left(\frac{W}{3}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5}\left(\frac{365-p}{365}\right) \quad \text{(lb/VMT)} \qquad (1)$$

where: E = emission factor
k = particle size multiplier (dimensionless)
s = silt content of road surface material (%)
S = mean vehicle speed, km/hr (mph)
W = mean vehicle weight, Mg (ton)
w = mean number of wheels
p = number of days with at least 0.254 mm (0.01 in.) of precipitation per year (see discussion below about the effect of precipitation.)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range as follows:

Aerodynamic Particle Size Multiplier For Equation					
≤30 μm[a]	≤30 μm	≤15 μm	≤10 μm	≤5 μm	≤2.5 μm
1.0	0.80	0.50	0.36	0.20	0.095

[a]Stokes diameter.

The number of wet days per year, p, for the geographical area of interest should be determined from local climatic data. Figure 13.2.1-1 gives the geographical distribution of the mean annual number of wet days per year in the United States.[17] The equation is rated "A" for dry conditions (p = 0) and "B" for annual or seasonal conditions (p > 0). The lower rating is applied because extrapolation to seasonal or annual conditions assumes that emissions occur at the estimated rate on days without measurable precipitation and, conversely, are absent on days with measurable precipitation. Clearly, natural mitigation depends not only on how much precipitation falls, but also on other factors affecting the evaporation rate, such as ambient air temperature, wind speed, and humidity. Persons in dry, arid portions of the country may wish to base p (the number of wet days) on a greater amount of precipitation than 0.254 millimeters (0.01 inch). In addition, Reference 18 contains procedures to estimate the emission reduction achieved by the application of water to an unpaved road surface.

The equation retains the assigned quality rating, if applied within the ranges of source conditions that were tested in developing the equation, as follows:

Ranges Of Source Conditions for Equation					
Road Silt Content (wt %)	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels
	Mg	ton	km/hr	mph	
4.3 - 20	2.7 - 142	3 - 157	21 - 64	13 40	4 - 13

Moreover, to retain the quality rating of the equation when addressing a specific unpaved road, it is necessary that reliable correction parameter values be determined for the road in question. The field

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III.B.5. Calculate the maximum Short-Term Impact, C_{ST}, from the area source using the equation below:

$$C_{ST}\ (ug/m3) = C_p \quad 100.$$

where C_p is the maximum Potential Annual Impact as defined above.

III.C. ALTERNATE AREA SOURCE METHOD

The following alternate area source method was developed specifically for remediation projects and urban scale emissions. It has the flexibility to permit the calculation of the maximum annual concentration <u>within</u> an area source. Annual impacts may be estimated both within and downwind from an area source. However, the method has not been modified to estimate short-term impacts. The method will perform better the closer the source characteristics and assumptions approximate those specified in Section IV.G. The contribution from nearby area sources can be calculated by the procedures outlined below. Only sources located within a distance of 3S (S is the length of a side of the area source) from the source being analyzed need be considered. The method can calculate impacts at receptor distances from the source boundary to a distance of 2.5S from the area source. This range encompasses practically all cases of interest in these types of applications.

The following procedures are valid for ground level area sources effectively less than 10 feet in height, with side lengths greater than 330 feet:

III.C.1. Determine the area source emission rate (Q_A) in units of lb/(hr-ft^2) by dividing the total annual emission rate, Q_a (lb/hr), by the area, A (ft^2), of the source.

$$Q_A \frac{(\text{lb})}{(\text{hr-ft}^2)} = \frac{(\text{emission rate})}{(\text{area})} = \frac{Q_a}{A}$$

III.C.2. Calculate the maximum Actual Annual Impact, C_a, <u>within</u> the area source as defined below:

$$C_a(ug/m^3) = K \quad Q_A \quad C_m$$

Where: K_1 = 15 for 330 ft $\leq$ S< 3300 ft
K = 30 for S $\geq$ 3300 ft
C_m = 1.355 x 10^6, a conversion factor from lb/(hr-ft^2) to ug/m^2-sec).

Appendix I

Toxicological Profiles

ACETONE

Acetone is a volatile ketone commonly used as a solvent. Limited information on the transport and fate of acetone was found in the literature reviewed. However, ketones in general are probably not very persistent. Acetone has a high vapor pressure and, therefore, would be expected to volatilize readily; however, because of its high water solubility, volatilization is probably limited. Once in the atmosphere, it is apparently oxidized. Acetone has a low Kow and, therefore, is probably not readily adsorbed. Biodegradation is probably important in determining the fate of acetone in the environment because of its aliphatic nature. Acetone is a colorless liquid with a sweetish odor. It is used as a solvent for waxes, oils, resins, rubber, plastic, lacquers, varnishes, and rubber cement. It is used in the production of lubricating oils, pharmaceuticals and pesticides.

Inhalation of small quantities of acetone over long periods of time can cause irritation of the respiratory tract, coughing, and headache. Workers exposed to 700- to 1,000-ppm acetone for 3 hours/day over many years complained of respiratory tract irritation, GI disturbances, dizziness, and loss of strength (Vigliani and Zurlo 1955). Workers exposed 8 hours/day to time-weighted average (TWA) acetone concentrations of about 1,000 ppm, with transient exposures to 6,500 ppm, frequently reported eye irritation. Other effects (e.g., headache, light-headedness, and nose and throat irritation) occurred intermittently and may have been due to exposures in excess of 1,000 ppm.

ALUMINUM

Aluminum has many uses including: corrosion-resistant chemical equipment, the electrical equipment, photoengraving plates, protective coatings, and an ingredient in rocket fuel and incendiary mixtures. Elemental aluminum is widely used in the construction, automotive, and aircraft industries, and aluminum compounds are used in paints, cosmetics, pharmaceuticals, and water purification systems.

Despite the widespread occurrence of aluminum in foods and drinking water, there is little indication that aluminum is toxic by the oral route. FDA considers aluminum cookware, packaging, pharmaceuticals, and food additives to be safe and nontoxic. It is likely that aluminum dusts have irritant properties. Case reports show that some aluminum workers develop fibrosis when exposed to aluminum dusts. Exposure was not well quantified, however, and the men were also breathing other dusts and fumes (ATSDR 1991).

There has been increasing interest in the possible relationship of aluminum to dementia in humans. People who have Alzheimer's Disease and other neurodegenerative diseases often have more aluminum than is usual in certain parts of their brains. This indicates that Alzheimer's patients may have a reduced blood-brain barrier, allowing more aluminum to accumulate in their brains. The route of exposure may be important because people who have been exposed to large amounts of aluminum dusts in factories have not been shown to develop Alzheimer's disease or other neurological deficits but people on renal dialysis who have received large amounts of aluminum orally or intravenously also can develop encephalopathy. When steps were taken to reduce aluminum exposure the symptoms were reversed (ATSDR 1991).

CADMIUM

Cadmium is a naturally occurring metallic element. In its pure form it is a soft silver-white solid. However, it is usually found in the ores of zinc, lead or copper chemically combined with oxygen (oxide), chlorine (chloride) or sulfur (sulfide). Cadmium has many industrial uses but mostly it is used in metal plating, pigments, batteries and plastics.

Cadmium occurs naturally in air, water, and soil, but for most people, food is the primary source of cadmium exposure. Other sources of elevated cadmium levels are from fertilizers, burning of fossil fuels, incineration of municipal waste or from zinc, lead or copper smelters. The primary route of exposure is from ingesting food but inhalation of dust or fumes can also occur. The dermal route is not significant.

Cadmium is not known to have any beneficial effects, but can cause a number of adverse health effects. The toxicity of cadmium depends to what compound the exposure occurs. Soluble forms (e.g., cadmium oxide) are more toxic than less soluble forms (e.g., cadmium sulfide). Short term effects of ingesting high doses include severe stomach irritation leading to vomiting and diarrhea (Clayton and Clayton 1981). Inhalation of high doses results in irritation of lungs. Other organs that may be affected by long-term low-level exposures to cadmium include this liver, nervous system, and blood.

Animal studies indicate that long term exposures to cadmium in air results in an increase in risk of lung cancer. Studies of humans known to have exposed to elevated levels (occupational) also show an increase in lung cancer. As a result, the U.S. Department of Health and Human Services has determined that cadmium and certain cadmium compounds may reasonably be anticipated to be carcinogenic (ATSDR 1991).

DIETHYLPHTHALATE

Diethylphthalate, is a clear, colorless liquid used as a solvent for cellulose esters, as a vehicle in pesticidal sprays, as a fixative and solvent in perfumery, as an alcohol denaturant, and as a plasticizer in solid rocket propellants. Diethylphthalate can be poisonous by intravenous route. It is also known to be an experimental teratogen and may be moderately toxic if ingested. It can irritate the eyes as well as the respiratory system via inhalation. Diethylphthalate is a narcotic in high concentrations. Diethylphthalate has few chronic toxic properties and seems to be devoid of any major irritating or sensitizing effects on the skin. Exposure to heated vapors may produce transient irritation of the nose and throat. Conjunctivitis, corneal necrosis, respiratory tract irritation, dizziness, nausea, and eczema are acute symptoms of exposure.

DI-N-BUTYLPHTHALATE

Di-n-butylphthalate is a colorless, oily liquid with a weak aromatic odor. It is used in plasticizing cellulose esters, and as an insect repellent. Di-n-butylphthalate is an experimental teratogen and mutagen. Human exposure causes irritation of the eyes, upper respiratory tract, and mucous membranes; labored breathing; ataxia; paresis; convulsions; and death.

1,1,1-TRICHLOROETHANE

1,1,1-Trichloroethane, $C_2H_3Cl_3$, is a colorless liquid with a sweet odor. It is also known as 1,1,1-TCA or methyl chloroform. 1,1,1-TCA has found wide use as a substitute for carbon tetrachloride. It is used as a dry cleaning agent, as a vapor degreasing agent, in textile processing, for cleaning precision instruments, as a propellant, and as a pesticide.

Weight-of-evidence classification by the USEPA is Group D, not classified. This classification indicates that there is no data to evaluate or that the evidence for carcinogenicity in humans and in animals is inadequate.

Acute health effects of 1,1,1-TCA may include: eye irritation, mild conjunctivitis, dizziness, incoordination, drowsiness, increased reaction time, unconsciousness, and death. It acts as a narcotic and depresses the central nervous system. Repeated skin contact may cause a dry, scaly, and fissured dermatitis. 1,1,1-TCA may be injurious to the liver and kidneys.

VANADIUM

Vanadium is a heavy metal used in the manufacture of rust-resistant steel and occurs naturally in mineral ores. Vanadium is an experimental mutagen and causes pulmonary allergy in humans. Heat decomposition emits toxic fumes of vanadium oxide. Acute effects of vanadium or vanadium compounds are respiratory irritation and irritation to the conjunctiva. Chronic exposure can cause pulmonary involvement, pallor, greenish-black tongue, paroxysmal cough, conjunctivitis, dyspnea and pain in the chest, bronchitis, and tremors.

ZINC

Zinc is a metal with many uses in industry. It can be found in pure form, or mixed with other compounds to form alloys such as brass, or chemical salts such as zinc chloride. Zinc compounds are found naturally in soil and water, and are present in most foods. Zinc is an essential element needed by the body in low doses.

Zinc compounds have variable, but generally low toxicity. Heat decomposition emits zinc oxide fumes which if inhaled fresh can cause a disease known as "brass founders ague" or brass chills. Zinc exposure is not cumulative, but has caused fatal lung damage. Soluble zinc salts have a harsh metallic taste and repeated small doses can cause nausea and vomiting. Larger doses cause violent vomiting and purging. Zinc chloride fumes can damage the mucous membrane lining the nasopharynx and respiratory tract and can cause a gray cyanosis. Zinc oxide or stearate dust can block ducts of sebaceous glands causing eczema.